PUBLIC WORKS

city county and state

september

1949 STATE UNIVERSITY SEP 30 1949

New York City Adopts Incineration

•

How High Costs Affect Highway Construction

•

Cleaning Pipe Line Increases Capacity 92%

•

How to Plan for Refuse Collection

•

Organization for Snow and Ice Control

★ ★ ★

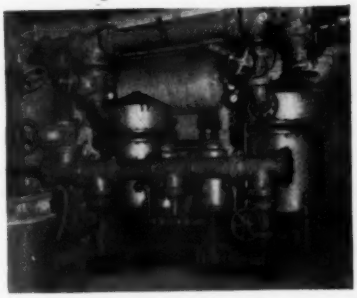
Complete Contents Listed on Page 5

In an Emergency or ANY Time

%PROPORTIONEERS%

Means Clear, Safe Water

When Gasport, N. Y. needed water filtration and chlorinating equipment in a hurry this summer, it was %Proportioneers, Inc.% that supplied it. A complete Pur-O-Cel System, flown direct to the drought-stricken area, rendered impounded creek water safe and clear—relieved what might have been a serious health problem.



Two-unit installation of %Proportioneers% Pur-O-Cel System. Note very compact arrangement of the diatomaceous earth pressure filters, and the simple piping layout.

%Proportioneers% Pur-O-Cel System combines highly efficient diatomaceous earth filtration with automatic hypochlorination. The system requires unusually small space, which saves construction and housing costs. %Proportioneers% duplex Chem-O-feeder feeds both filter aid body-coat and hypochlorite. Finished water is clear and brilliant — turbidity is completely eliminated. Operation is simple and economical — Pur-O-Cel is backwashed with a minimum of water and thereby quickly restored to its original efficiency. — When you think of pure water, think of %Proportioneers% — over 27,000 %Proportioneers% units are working in all parts of the world. Write for Bulletin 1550.

% PROPORTIONEERS, INC. %

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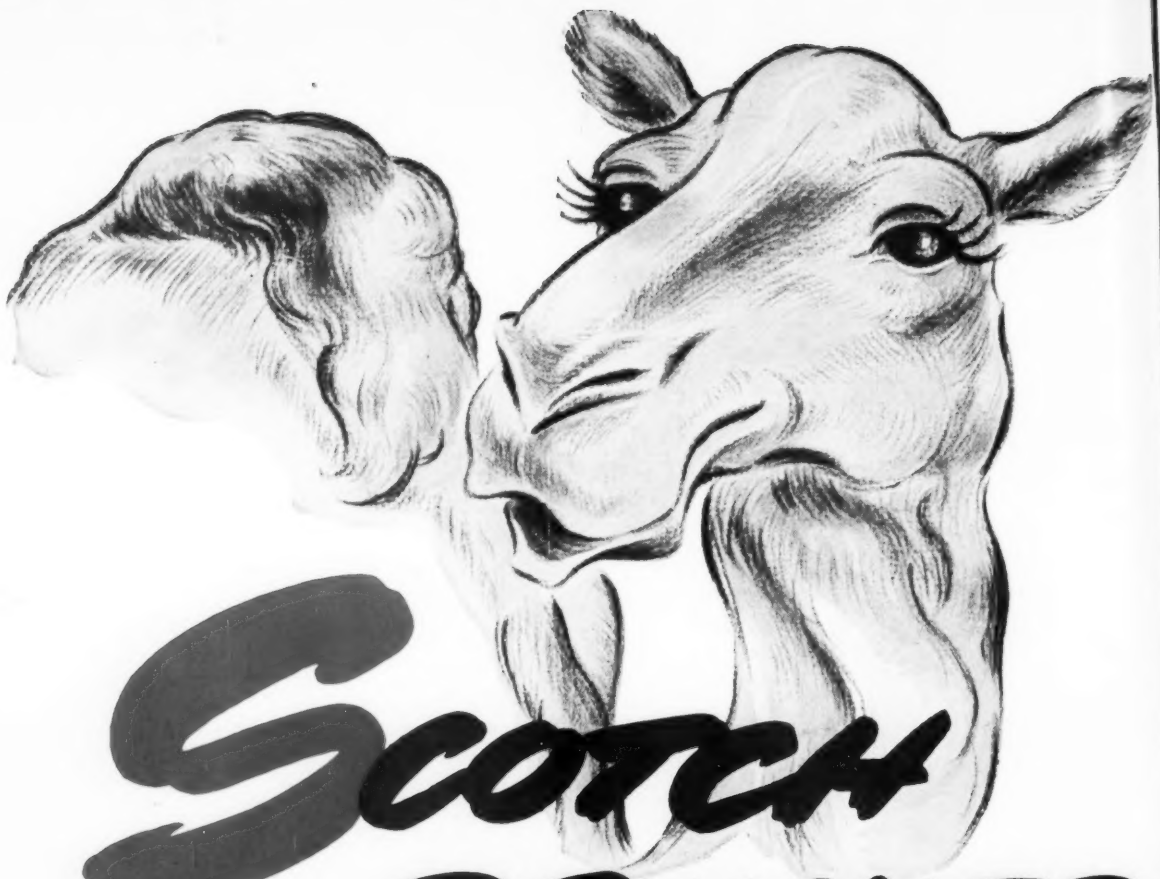

SCOTCH DRINKER

"SCOTCH" with fuel and lubricants, yet tireless on the long grind, Internationals are the tractors to fulfill your most exacting requirements. ● International diesel crawlers deliver the maximum amount of work for the fuel consumed. They handle loads that pay. They'll work continuously on the job, without flagging. Secret of their ability to drive through tough going is the reserve lugging ability of their powerful diesel engines. In the sensitive speed governor, a torque boosting device acts instantly to increase engine torque as much as 15% when the load demands it. ● Your International Industrial Power Distributor can supply the size crawler you need—now.

INTERNATIONAL HARVESTER COMPANY • Chicago

This TD-9 diesel easily handles sanitary fill work, clears and levels dumping areas, assists in street and road repair and moves or grades earth for landscaping. Working long hours at low cost, it is a real time and money saver.

Standardize on Power that Pays

CRAWLER TRACTORS
WHEEL TRACTORS
DIESEL ENGINES
POWER UNITS

INTERNATIONAL HARVESTER

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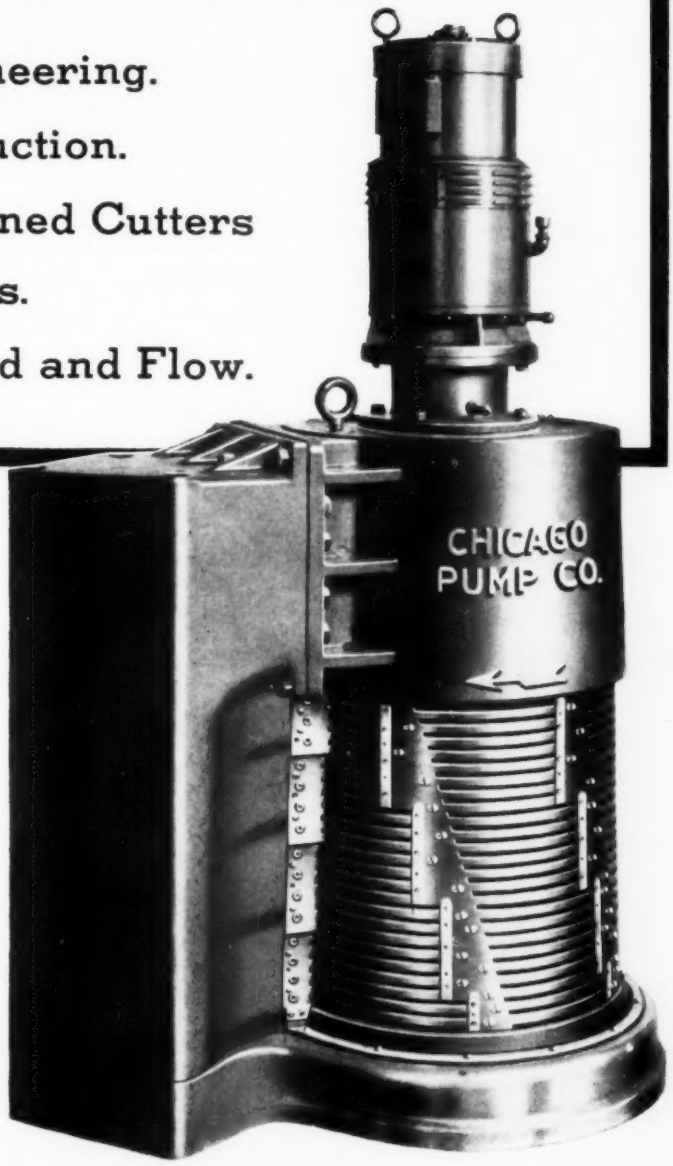
4 MUSTS OF COMMINUTION

1. Precision engineering.
2. Rugged construction.
3. Properly designed Cutters and Shear Bars.
4. Controlled Feed and Flow.



All four are found only in the Chicago Comminutor. The Chicago Pump Company developed and perfected the comminution process. The Chicago Comminutor alone meets all the requirements that 16 years' experience show are necessary for successful operation. Nearly 2500 installations prove that the Chicago Comminutor does the job.

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

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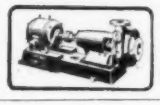

Flush Kleen, Scru-Peller, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers,

Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

VOL. 80 PUBLIC WORKS No. 9

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SEPTEMBER, 1949

ROADSIDE REPORT *by Bert Snooks, owner of the Texas Hauling Company, Houston, Texas, G.V.W. ratings for Ford F-7's and F-8's shown are 19,000 lbs. and 21,500 lbs. respectively.*

"The FORD BIG JOB is more rugged, in my opinion, than any other truck made!"

"I THINK the Ford 145-H.P. BIG JOB is the best all purpose truck on the market," reports Bert Snooks. "I am operating three Ford F-8's and four F-7's with eight-yard bodies. These seven BIG JOBS are doing a better job than fourteen 2-ton trucks with four-yard bodies that I operated in 1947. My Fords have from 15,000 to 100,000 miles and the cost of repairs has been negligible. The Ford BIG JOB is more rugged, in my opinion, than any other truck made."

In terms of *Payload-Performance* the Ford BIG JOBS have no equal in their class. No other truck offers so much payload capacity in relation to chassis weight, with as high a horsepower rating per gross ton. This means bigger payloads within legal load limits. It means faster, more profitable delivery of big loads. Ford's high *Payload-Performance* is evidence of Bonus Built construction. Each of over 150 Ford Truck models is Bonus Built . . . built extra strong to last longer.

ONLY THE FORD BIG JOB HAS ALL THESE FEATURES

- ★ New 145-h.p. Ford V-8 engine for top performance.
- ★ Ford concentric dual-throat carburetor for more power, more economy.
- ★ New heavy duty 5-speed transmissions—overdrive or direct-in-fifth—for operating flexibility.
- ★ Big Ford power-operated hydraulic brakes; front 16-inch by 2¼-inch; rear 15-inch by 5-inch double cylinder on F-7, 16-inch by 5-inch double cylinder on F-8. Air brakes also available for F-8.
- ★ Ford Super Quadrax single speed axles; two-speed axle available in Model F-8.
- ★ Large diameter (10-inch) wheel bolt circle with 8 studs to allow for extra-strong hub construction.
- ★ Million Dollar Cab with Ford Level Action suspension for greater driving comfort.
- ★ Nationwide service from over 6,400 Ford Dealers.
- ★ Ford Bonus Built construction for long truck life.

Gross Vehicle Weight ratings: F-8 up to 21,500 lbs., F-7 up to 19,000 lbs. Gross Combination ratings: F-8 up to 39,000 lbs., F-7 up to 35,000 lbs.

FORD 1949 *Bonus Built* TRUCKS 1949

BUILT STRONGER TO LAST LONGER

USING LATEST REGISTRATION DATA ON 6,106,000 TRUCKS, LIFE INSURANCE EXPERTS PROVE FORD TRUCKS LAST LONGER!

When you need special information—consult the READERS' SERVICE DEPT. *on pages 31-85*

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Public Works

THE ENGINEERING AUTHORITY IN THE CITY-COUNTY FIELD

Edited by
W. A. HARDENBERGH and A. PRESCOTT FOLWELL

CONTENTS FOR SEPTEMBER, 1949

Controlling pH Automatically for Industrial Waste Treatment 21
How to Plan Refuse Collection 22
Standard Operating Procedures for Street Opening Control 24
Control of Oil Pollution. *By Ross E. Hoffmann* 26
Cleaning Pipe Line Increases Capacity 92% 28
How High Costs Affect the Highway Program. *By R. H. Wilson, H. C. McCarthy and R. R. Norton* 29
How Olympia Got a Better Water Supply. *By H. G. Porak* 31
Bethlehem's Best Snow Removal Job. *By G. H. Reussner* 33
342 Cities Tell What is Their Most Useful Equipment 34
Organization for Snow and Ice Control. *By B. W. Davis* 38
New York Adopts Incineration for Refuse Disposal. *By Henry Liebman* 41
Good Practice in Backfilling Trenches 48

PUBLIC WORKS DIGESTS

The Water Works Digest 52
The Highway and Airport Digest 58
The Sewerage and Refuse Digest 66

PUBLIC WORKS ENGINEERING DATA

Snow Removal Methods in Newton 30
Bid Prices on Sewer Construction 46
Pipe Cleaning Increases Discharge 64% 46
BHC Successfully Used for Fly Control 46
Bid Prices on Sewer Tunnel Construction 46
Wettable DDT Compound Easily Applied 47
Vibration and Bond of Reinforcing Steel 47
Photoelectrically Controlled Street Lights 47
Reducing the Pigeon Nuisance 47
Developments in Colored Asphalt 50
Street Maintenance Difficulties in San Francisco 60
A New Type of Asphaltic Concrete 60
Sewage Sludge for Highway Shoulders 62

DEPARTMENTS AND SECTIONS

The Editor's Page 7
Letters to the Editor 14
Briefs of Books 15
Worth Telling 30
Leaders in Public Works 30
Public Works Equipment 76
The Engineers' Library 81
86

When snow, sleet and freezing rains hit your city, your first consideration is to keep traffic moving safely and maintenance of ice-free streets with salt, calcium chloride, or mixtures of these with abrasives, results in rust-forming slush. Your tax-paying motorists wail over their rusted car bodies, and you are concerned with the damage to gratings, bridges and other steel construction in street and highway systems.

Now, as more than 50 communities proved to their own satisfaction last winter, there is a way to reduce these rust headaches and at the same time keep traffic moving on ice-free streets. It's the BANOX* way!

Banox inhibits the corrosive effects of ANY slush—from pure water up to the most heavily saturated brines. It costs very little—even less than last year, thanks to the greatly increased production—and the saving to taxpayers and officials is measured not only in the pocketbook but on the nerves as well.

For full information, write to Calgon, Inc. Our representative will furnish samples of Banox and steel test strips for you to run your own simple, conclusive tests.

*Registered trade-mark of Calgon, Inc.

BANOX IN BRIEF

- Works in any type of slush.
- One pound treats 100 pounds of salt.
- Protection lasts through later thaws and rains.
- Odorless and harmless to skin, eyes, clothing, plants, trees.
- Can't harm paint, automobile finishes or tires.
- Protects both rusted and freshly exposed metal.
- Costs less than 2¢ per capita per year.

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When you need special information—consult the **READERS' SERVICE DEPT.** *on pages 81-85*

The EDITOR'S PAGE

A Message to Our Readers

With this issue, PUBLIC WORKS takes another forward step—the use of a coated paper which should make illustrations clearer and better. Though, due to paper delivery complexities, some of this month's copies, and a few of next month's, will still be on the old type of paper, this is perhaps an appropriate time to report to our readers on the program that has been under way here at PUBLIC WORKS for the past three years.

Like most every other business, PUBLIC WORKS was hit very heavily by the war, losing seriously in personnel. The first step, therefore, at the end of the war, was to rebuild our staff. We were most fortunate in our selection of a number of fine young men, but they had to learn publishing instead of driving tanks or operating warships. So a training phase was necessary.

The next step, coincident with the training program, was to review our circulation coverage and to make it as nearly perfect as was humanly possible. There had been an unprecedented shift of personnel during the war years, and this has continued to the present. These changes have had to be searched out and key personnel located. This has been done with a resulting increase in circulation and as nearly perfect coverage as was possible of the men responsible for engineering work in this field.

Since the war was then over, we adopted an editorial program of looking forward, not backward to wartime conditions. The rate of pay for contributed articles was increased, so that the best possible articles would be available for our readers. To make PUBLIC WORKS more easily readable, and to improve its appearance, we engaged a recognized leader in this field to redesign it so as to make it the finest appearing magazine possible. We have embarked on a program for better illustrationing, and have made some progress though we feel that what we have done is only a beginning.

This is a progress report; we do not ever expect to finish the job to our complete satisfaction; but we shall continue to try to make PUBLIC WORKS better and more useful and more valuable. We believe there are possibilities for service in engineering magazines which are, as yet, untouched. We shall continue to try to develop them; and in this work we shall need and will greatly appreciate the continued cooperation and encouragement of this industry and profession which we serve.

Reserve Officer Retirement

A more recent ruling of the Comptroller General is that a reserve officer is entitled to retirement after 20 years of service at age 60, whether or not he is a member of the reserves when he reaches retirement age. This is a reversal of a previous ruling which adversely affected many reserve officers, and is a proper interpretation of Public Law 810 which provides retirement benefits for reserve officers. Under the present training policies and programs, many reserve officers found it difficult to maintain an active status. The new ruling relieves this situation.

It Is Time to Get Rid of Garbage Dumps

It has too long been the habit of municipal and health authorities to overlook the shocking disregard for health and decency that exists in the methods of garbage and refuse disposal used by most of our municipalities. Dumps breed flies and rats prolifically and create intolerable odors; and hog-feeding areas that are even worse, if this is possible, are commonplace.

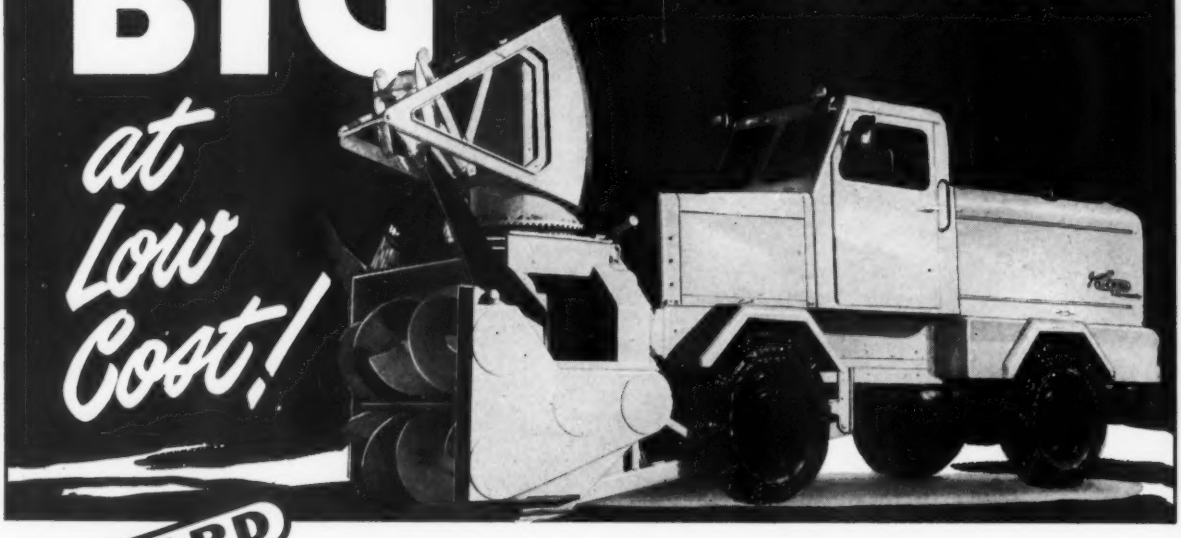
Health officials and authorities propagandize fly and rat control programs that do not mean a thing because they do not touch on the basic causes that produce these menaces to health and comfort. Municipal authorities, in too many cases, find it difficult to get the money for needed refuse disposal facilities, and frequently prefer to spend the money they have on projects far less vital to the health and welfare of the community.

A bigger place for adequate refuse disposal is needed on our shelf of desirable public works projects; but these are often far in the future. What we need now is for health authorities to attack with vigor and directness this problem of providing sanitary methods for the disposal of wastes; and for municipal authorities to put this problem high on the list for immediate action. All manufacturers of equipment for collection and disposal of refuse ought to join in this program by showing municipalities what they have and why its use will add immeasurably to the health and comfort of a community.

The False Alarms About the Dangers of DDT

There has been a lot of baloney lately about the dangers of using DDT. According to some of the boys who like to see their names in the headlines, DDT can cause everything from DTs to Q fever. Actually, very extensive tests were run by the Army and other governmental agencies before DDT was adopted for use during the war. These tests showed that there was no danger connected with its use—not even to the men who were using it day after day and were exposed to it in an oil solution, provided elementary precautions were taken. There was even no evidence that injury resulted from the neglect of such precautions. Since the war, DDT has been used widely and there is no evidence of any sound nature to prove that it has made people sick or poisoned the milk of cows that live in barns sprayed with the chemical. DDT has been one of the great advances in public health. It is regrettable that unproven theories—they can hardly be called claims—have created a doubt in the minds of some of the timorous.

BIG PERFORMANCE *at Low Cost!*



SICARD

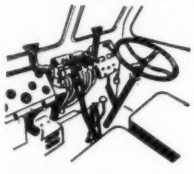
SNOW MASTER JUNIOR

. . . AS AUXILIARY EQUIPMENT . . . FOR LIMITED BUDGETS . . . FOR SMALLER COMMUNITIES . . .

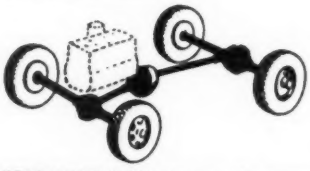
Efficient, economical snow clearance now is within the reach of even small budgets with the Snow Master *Junior*, a product of Sicard research and engineering. Husky, powerful and versatile, the *Junior* answers the demands of a host of new users who want a low-cost machine able to stand the gaff all winter long. It has proved itself the ideal machine for many cities, towns, smaller communities and large industrial plants. The *Junior* also is in demand as auxiliary equipment to the larger Snow Master in the biggest cities and on airports and airdromes.

The *Junior's* 100-inch wheelbase makes it highly manoeuverable, and its sturdy four-wheel-drive gives it positive traction in the heaviest snow and slush. This versatile machine has all the job-proven Sicard features: twin augers with unique equalizer bar, long-range reversible casting turbine to propel snow far from cleared areas, and the patented Sicard "Wrist-Action" Chute for pack-loading moving trucks or spot-casting snow to vacant lots, lawns or fields. The *Junior* is equally at home in narrow laneways, around buildings, on hangar aprons and in busy downtown traffic areas. It gives big-machine performance at small-machine cost.

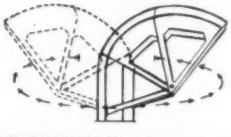
For name of your nearest distributor, write to Sicard Industries Inc., manufacturers of the Snow Master Junior, the Snow Master, the Sanivan and the Master Flusher.



DRIVER COMFORT. Finger-touch hydraulic controls located in heated cab for comfort and efficiency.



FOUR-WHEEL DRIVE. Sure-traction transmission gives power to spare. The *Junior* goes through where others stall.



FAST, SURE LOADING. Exclusive, patented "Wrist-Action" Chute swings on a 220° arc, provides unmatched versatility.

SICARD INDUSTRIES INC.

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Plant: 753 W. Main St., Watertown, N.Y.
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228 N. Lasalle St., Chicago, Ill.

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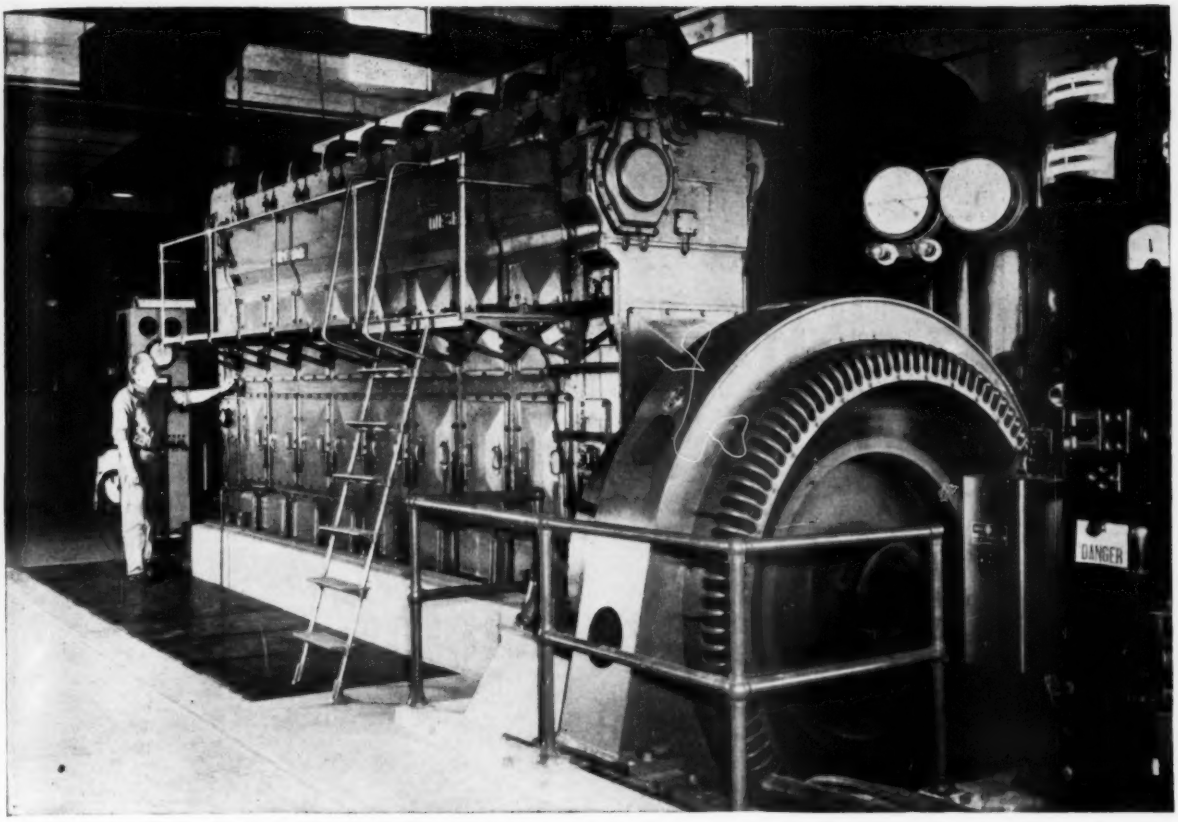


THEY'RE TURNING NIGHT INTO DAY

An Iowa town is enjoying brighter nights and dependable electrical power because they installed a Superior Diesel. The engine they chose is a supercharged model 80-GX-8. It will deliver dependable power for many years under continuous heavy duty service.

Superior Supercharging provides greater power output from the same engine. This overall increase in mechanical efficiency means lower fuel costs per kilowatt hour at maximum and partial loads. Operation of Superior Supercharging is fully automatic. No control devices are necessary.

One of our field representatives will be glad to show you how a Superior Supercharged Diesel can solve your power problems. Just write and tell us when he can call.

THE NATIONAL SUPPLY COMPANY
SUPERIOR ENGINE DIVISION
Plant and General Sales Office: Springfield, Ohio

THE NATIONAL SUPPLY COMPANY NSCO

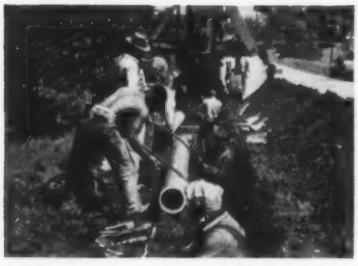
Superior DIESEL

Here's how TRANSITE PRESSURE PIPE meets these 7 basic water-line problems . . .

IF YOU are faced with some—or all—of these 7 common water-line problems, here is information about Johns-Manville Transite* Pressure Pipe that may be of help to you . . . facts that tell how this modern asbestos-cement pipe is helping to solve these problems in many communities.

1. Handling costs:

Because it is light in weight and easy to handle, Transite Pressure Pipe keeps handling costs down. Loading, unloading, and all other subsequent handling operations are simplified. More footage can be hauled per truckload—reducing trucking costs—and distribution along the trench is easier and more quickly accomplished. Moreover, mechanical handling equipment is not necessary except where larger sizes are being used; the pipe sections are easily lowered into the trench with rope slings.



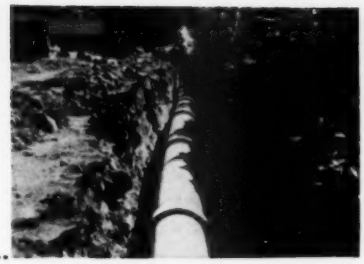
2. Installation costs:

Transite Pressure Pipe offers important economies that help combat increasing costs of water-line installation. It is quickly and easily assembled in the trench. A coupling puller is the only tool necessary. Often, the pipe can be assembled so rapidly that the same foreman supervises both excavation and installation. The speed with which Transite is assembled means that the job is completed with a minimum of time and labor, thereby contributing important reductions in the overall cost of the system.

*Transite is a Johns-Manville registered trade mark

When you need special information—consult the **READERS' SERVICE DEPT.** *on pages 81-85*

3. Soil corrosion:



Two factors give Transite Pressure Pipe exceptional resistance to corrosion: (1) the corrosion-resistant materials of which it is made; (2) the especially developed Johns-Manville process of manufacture which imparts a high degree of chemical stability to the finished pipe. This high resistance to corrosion has been substantiated by numerous installations. Many of these are serving as replacements in soils so destructive that the useful life of the pipe materials previously used had been seriously curtailed.

4. Internal corrosion:

Transite Pipe, because of its asbestos-cement composition, is not affected by tuberculation. Therefore, it is not necessary to resort to pipe of larger diameter to offset the internal effects of this costly form of pipe corrosion. And because progressive reduction of delivery due to tuberculation capacity is never a problem in a Transite pipe line, pressures and flows remain high—pumps operate at higher efficiencies. These factors are often reflected in better service and lower water rates in communities served by Transite lines.

5. Joint leakage:

Transite's Simplex Coupling was designed to minimize underground leakage . . . and to provide maximum protection against failures resulting from trouble at joints. It consists of only three parts: a Transite sleeve, machined to fit over the pipe ends, and two rubber rings which, when assembled, are tightly compressed between pipe and sleeve. The joint thus formed is tight and flexible. It remains tight in service. Furthermore, each joint may be checked for proper assembly immediately upon completion.

6. Vibration and stresses:

Transite's flexible joints effectively absorb the vibration of heavy traffic—an especially important factor where pipe is laid under busy highways, or near railroad and street car tracks. Because each joint is capable of deflection up to five degrees, the entire line has a flexibility not ordinarily found in other types of waterline construction. This helps compensate for soil movements and other stresses to which the pipe may be subjected . . . provides an effective safeguard against costly pipe failures.

7. Maintenance:

In thousands of communities, Transite Pipe—with its advantages of joints that remain tight and flexible, its corrosion resistance, and immunity to tuberculation—provides low-cost water transportation that requires little, if any, maintenance. Transite lines do not have to be cleaned, lined, or replaced because tuberculation has reduced their original capacity. Reports from communities all over the country prove that Transite's asbestos-cement structure provides economies that continue through the years.

If you would like additional information about Transite Pressure Pipe, write to Johns-Manville, Box 290, New York 16, N.Y. Ask for Brochure TR-11A.

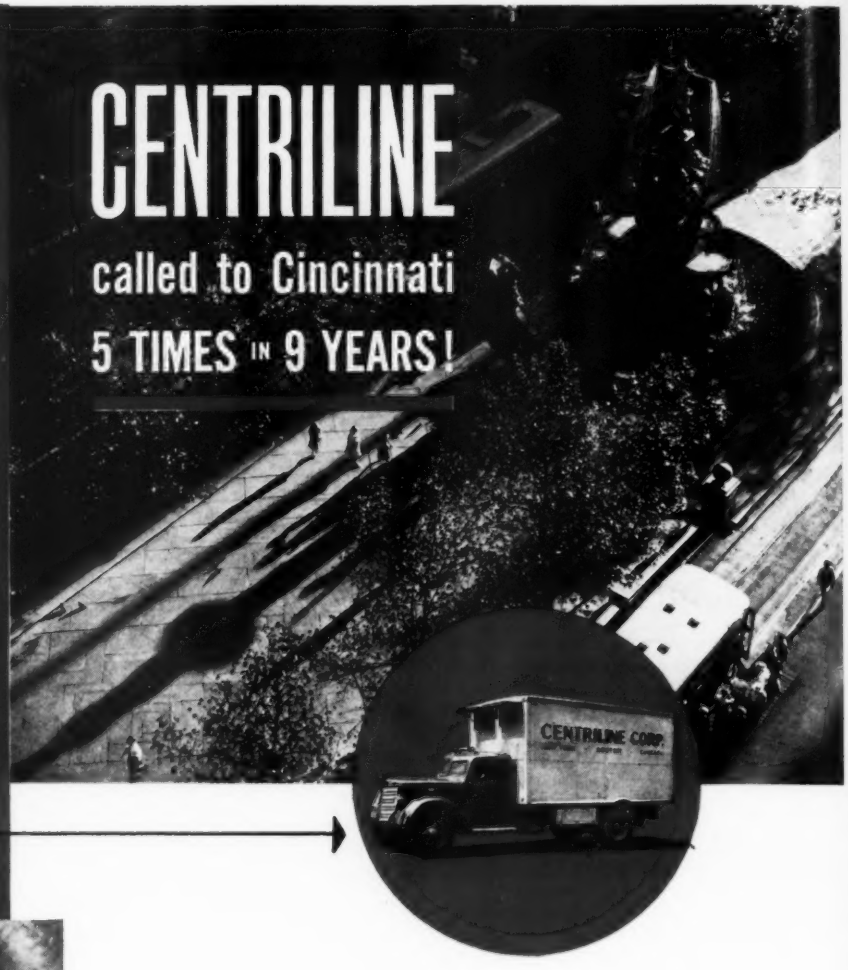
JOHNS MANVILLE JM PRODUCTS

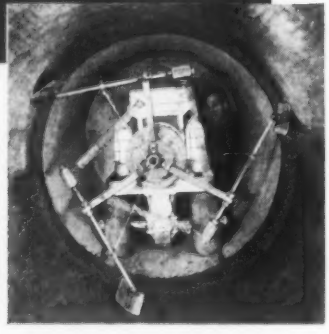
Johns-Manville Transite Pressure Pipe

where performance counts . . . count on Centriline

CENTRILINE

called to Cincinnati 5 TIMES IN 9 YEARS!





In Cincinnati's program to recondition its water mains for greater efficiency and economy, Centriline has recently completed its fifth contract since 1940.

A total of more than 68,000 feet of cast iron pipe has been cleaned and uniformly lined with dense cement mortar in this city. Pipe sizes were from 24" to 48". On the last job, the average speed of lining was better than 1,000 feet per day —resulting in minimum interruption in water distribution.

Cincinnati has found that Centrilining pays. It will establish and maintain a high coefficient, reduce pumping cost, stop all leakage and terminate deterioration. Consult Centriline's experienced hydraulic engineers. A 28-page illustrated bulletin is also available on request.

CEMENT MORTAR LININGS FOR WATER MAINS CENTRIFUGALLY APPLIED in strict conformity with A. W. W. A. Specifications.

CENTRILINE CORPORATION

140 CEDAR STREET

NEW YORK 6, N. Y.

CENTRILINE PROCESS

When you need special information—consult the READERS' SERVICE DEPT. *on pages C1-C5*

Only A. O. Smith gives you ONE source of

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with SMITHway Vertical Turbine Pumps

All major pump parts of A.O.Smith Pumps are designed together, built together, to *work* together—your assurance of years of dependable, low-cost service.

When you choose an A. O. Smith Pump, you know it is *all* A. O. Smith from motor to strainer—SMITHway all the way down. You can be sure that the sum of A. O. Smith's 75 years of experience has been engineered into *every* pump part, to give you a superiority you can depend on under the toughest operating conditions.

Weight Where Weight Belongs. A. O. Smith discharge-head assemblies are built of heavy steel plate, formed and welded into the strongest, most compact design. Support for the driver and suspended assemblies is rigid, vibrationless, yet easily accessible.

Bowls are precision-machined from hard, close-grained cast iron, fitted with smooth, streamlined diffusion vanes contoured for maximum efficiency. Bronze impellers, closed or semi-open, are dynamically and hydraulically balanced.

"Tailor-Made" for Each Job. Complete interchangeability of major assemblies lets you select the right combination of driver, column pipe, lubrication, and impeller to fit each pumping application. You have an application-engineered pump exactly right for each job.

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Write or wire for details of the A. O. Smith Vertical Turbine Pump Distributor's Franchise, still available in a few territories. Send the coupon for our colorful illustrated Pump Bulletin.

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VERTICAL TURBINE PUMPS

Atlanta 3 • Chicago 4 • Houston 2 • Los Angeles 14
Dallas 1 • New York 17 • Midland 5, Texas
Philadelphia 3 • Seattle 1 • San Francisco 4
Pittsburgh 19 • Tulsa 3
International Division: Milwaukee 1

A. O. Smith Corporation, Dept. PW-949
Milwaukee 1, Wisconsin

Without obligation, send us your illustrated descriptive bulletin on A. O. Smith Vertical Turbine Pumps.

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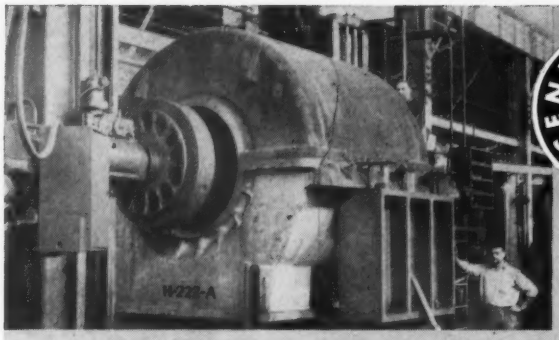
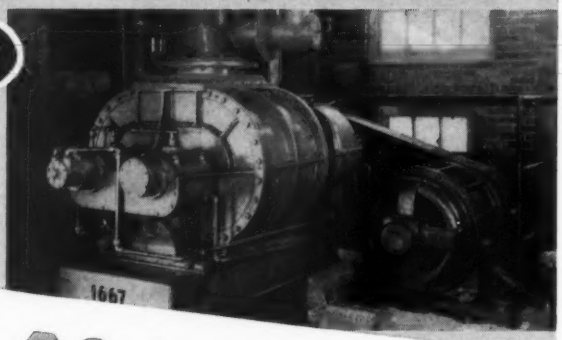


R-C Centrifugal Blower, with capacity of 69,300 CFM, being built in our plant.

ROTARY

R-C Rotary Blower, type RCD, capacity 6,200 CFM.



LET *R-C dual-ability* SETTLE THE QUESTION

If you are in doubt about whether Centrifugal or Rotary Positive units will do the best job of handling gas or air on any specific application, you can obtain an unbiased answer from R-C *dual-ability*.

Because we build both types, in wide ranges of sizes and designs, we can make sound comparisons and can recommend without prejudice the units whose capacities, pressures, drives and other characteristics deliver the best performance.

Only Roots-Connersville gives you this *dual choice*. It comes from 95 years of designing and building gas and air handling equipment, exclusively.

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BLOWER BUILDERS R-C SINCE 1854

BLOWERS • EXHAUSTERS • BOOSTERS • LIQUID AND VACUUM PUMPS • METERS • INERT GAS GENERATORS

★ ★ ONE OF THE DRESSER INDUSTRIES ★ ★

When you need special information—consult the READERS' SERVICE DEPT. *on pages 81-85*

Letters

OUR SINCERE APOLOGIES

In connection with the picture of W. J. Orchard, which we ran on the front cover of our July issue, Mr. Orchard tells us that he did not receive the Medal for Merit, but rather the Certificate of Merit. We are sorry for this error of fact on our part, though, knowing personally of some of the contributions made by Mr. Orchard during the war, we still feel he was entitled to the most that could be given him.

The Editors

STRESS ANALYSIS

Some time has elapsed since you published a notice of "The Traverse Method in Stress Analysis." Meanwhile I have kept at the task of trying to introduce it and have learned a little about promotional work. Last June, I drove with my wife to Madison, Wisc., to attend the 50th reunion of the class of 1899. At each of the colleges and state highway offices where I stopped. I disposed of one to six copies. The method is now becoming fairly well known. The book has been translated into German and will probably be published in that language. Ing. Dr. C. V. Kloucek of Prague, one of the leading European specialists in analyzing continuous frames, wrote me he had received copies of the magic roof problem (plate 54).

Ralph W. Stewart,
1200 Arapahoe St.,
Los Angeles 6, Calif.

SEWAGE DISPOSAL IN INDIA

The Bombay municipality has started on a program to provide sewage treatment to handle about 150 mgd., using biofilters, separate sludge digestion, etc. I am already in charge of a 14 mgd. plant employing activated sludge, closed trickling filters, separate sludge digestion and gas utilization for heating, cooking and electric power, and shall have to look after these larger works also. In Dorr Co's office in Bombay, I saw a copy of your Sewerage Manual. It struck me as very valuable and useful in my work. I

would like a copy of the latest edition if you could oblige a far-away Indian scientist and help him in his work.

Y. N. Kotwal,
Sup't. & Chemist,
Dadar Purification Works
Bombay 14, India.

(Ed. Note: Sent!)

MORE FROM INDIA

We have gone through a copy of Public Works and are anxious to subscribe. Our main reason for subscribing, apart from the interesting features it contains, is that we wish to be able to reproduce, with acknowledgement, your articles in our own "Municipal Journal and Public Works" for the purpose of educating our subscribers on the progress achieved in public works. Please give us your permission to do this.

The Editor,
Municipal Journal &
Public Works,
Tardeo Road, Bombay 7.

(Ed. Note: Permission granted.)

Books in Brief

CONSTRUCTION ESTIMATES & COSTS

The second edition of a book by H. E. Pulver. Covers wood and masonry construction; roofing, painting and plastering; concrete and structural steel; heating and air conditioning; plumbing and electrical work; and other construction problems. 653 pages; 287 illustrations and tables. McGraw-Hill Book Co., New York. $6.

THE TRAVERSE METHOD IN STRESS ANALYSIS

A book in mimeographed form "The Traverse Method in Stress Analysis" has been prepared by Ralph W. Stewart, MASCE, formerly Engineer of Bridge Design of the City of Los Angeles. It comprises 54 plates of which 19 are tables of properties of, and fixed end moment coefficients for, beams of variable moment of inertia. There are 36 pages of explantory text. It begins at the fundmentals of the treatment of computations of bending moments in continuous frames and carries through to the solution of difficult problems. The method is a new one. It is particularly adapted to the computation of bending moments in, and influence lines for, rigid frame concrete bridges. Obtainable from the author, Ralph W. Stewart, 1200 Arapahoe St., Los Angeles 6. Calif. $5 postpaid.

No Snow Too Deep - No Road Too Steep

Model 423 used by the Bell Telephone Co. of Nevada for emergency line repairs in the High Sierras.

Tucker SNO-CATS

Carry Men and Equipment to Isolated Places — Over Any Snow Condition!

Model 443 Utility Double Drive 8-passenger 3-door sedan, 95 H.P. Climbs grades to 65%

Sno-Cat's exclusive sliding pontoon. Sinks in less than a man on snowshoes.

Model 524 commercial 7-passenger 4-door sedan, 115 H. P. Climbs grades to 35%

- OVER DEEP COVERED ROADS
- ON STEEP SIDE SLOPES
- THROUGH WOODED AREAS
- THROUGH DEEP FRESH SNOW
- AND UP STEEP GRADES

Emergency maintenance crews can reach isolated places in a few hours where normally it would take days of tedious travel by ski or snowshoe with the amazing Tucker Sno-Cat. The Sno-Cat's ability to travel over any depth or condition of snow, to climb steep grades and cross severe side slopes, plus its economy of operation make it a "must-have" for outdoor maintenance work in snow country.

HERE'S WHAT USERS SAY:

". . . brief outline of some of the trips with our two Tucker Sno-Cats, Models 422 and 524. To start with, they will both do what you people said they would do and more. We used them in maintaining telephone and electric transmission lines. In this work we saved both time and money and restored service in one day that would have taken a week on skis and snowshoes . . . the deeper the snow the better the Sno-Cats work . . ."
By Dudley Snider, Shop Foreman for City and County of San Francisco, Hetch Hetchy Water Supply, Moccasin, California.

". . . we are convinced by actual experience that the Tucker Sno-Cat will carry men and materials to isolated places over snow covered terrain with steeper slopes than is practical or possible with any other type of mechanical equipment with which we are familiar."
From Salt Lake City Pipe Line Co. Letter of March 8, 1949 (Subsidiary of Standard Oil Co. of California).

Send for FREE Descriptive Folder

TUCKER SNO-CAT CORPORATION
Medford 1, Oregon
Please send me your descriptive folder on full line of Tucker Sno-Cats.
Name .....
Address .....
City ..... State .....

When writing, we will appreciate your mentioning PUBLIC WORKS

Don't Let It Rain *Under* Your Pavement

This recently developed portable kettle is ideally suited to prepare the small amounts of Flintseal necessary for sealing

Moisture and other foreign matter...infiltrating at the joint...play havoc with pavement. Get Positive protection with FLINTSEAL.

Here's a short cut to long life and low maintenance for highways, airport runways and other concrete pavement: *protect each and every joint with Flintseal.**

You'll get a smooth, neat joint that *far* outlasts old-fashioned materials. And you get a trouble-free, *positive* seal.

Why? Because Flintseal *stays* resilient. It won't flow . . . even in hottest weather. It won't become brittle and crack . . . even on the coldest days. As a result, Flintseal forms a tight, lasting bond to concrete that maintains a *positive* seal throughout repeated cycles of expansion and contraction of the slab.

Complete information and application data on Flintseal are yours for the asking. Write, today, for your *free* copy of our latest folder on this modern, rubber-bearing, thermoplastic joint-sealing compound.

THE FLINTKOTE COMPANY, *Industrial Products Division*
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

ATLANTA • BOSTON • CHICAGO HEIGHTS • DETROIT • LOS ANGELES
NEW ORLEANS • WASHINGTON • TORONTO • MONTREAL

FLINTKOTE INDUSTRIAL PRODUCTS

When you need special information—consult the **READERS' SERVICE DEPT.** *on pages 81-85*

OPEN REFUSE FEEDS THIS Disease Carrier!

Protection from Disease Carriers Is a Major Advantage of the Dempster-Dumpster System of Bulk Rubbish Collection

Rats and flies feeding on open refuse are a health menace no progressive city can endure. That's why, in more and more cities, the sanitary Dempster-Dumpster system of bulk rubbish collection is being installed. Many depositories, which are actually large detachable containers, are placed at convenient locations in business districts, housing sections, apartments and schools, in fact, everywhere that the volume of rubbish would constitute a major sanitation problem if left uncovered. Once the rubbish is placed inside and the convenient door closed, no rats or flies can contaminate it . . . no wind can scatter it.

Another great advantage of the Dempster-Dumpster System is the simple, low-cost manner in which the rubbish is collected. The Dempster-Dumpster Truck Hoisting Unit makes scheduled rounds, picks up each full container in turn, hauls it, dumps it and returns the empty to its original location. Shown at left are the three simple steps in handling a container. Top, truck hoisting unit prepares to pick up loaded container. Center, container in carrying position. Bottom, container is automatically dumped. One man, the driver, handles the entire operation from hydraulic controls in the cab. Help your city to cleaner, more efficient bulk rubbish collection by writing today for complete information.

DEMPSTER DUMPSTER
TRADE MARK REG.

DEMPSTER BROTHERS, Inc.

999 DEMPSTER BLDG. KNOXVILLE 17, TENN.

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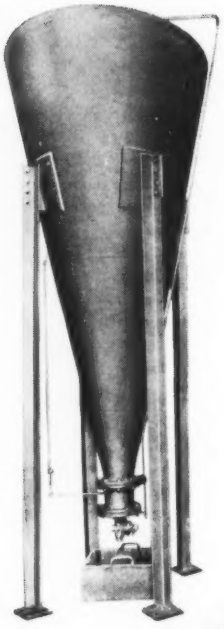
For dependable
8-minute softening use the
streamlined Permutit® Spiractor®

Permutit has added new speed to lime treatment. The Spiractor softens water twenty times faster than old style methods and takes up far less space!

FAST but SURE!



The Spirator is sturdy and dependable, operates simply, and requires a minimum of maintenance. Raw water mixed with lime enters at the base of the cone at a velocity high enough to suspend a catalyst bed of calcium carbonate granules, low enough to avoid carry-over. The water softening reaction results in precipitates that are deposited on these granules by accretion.

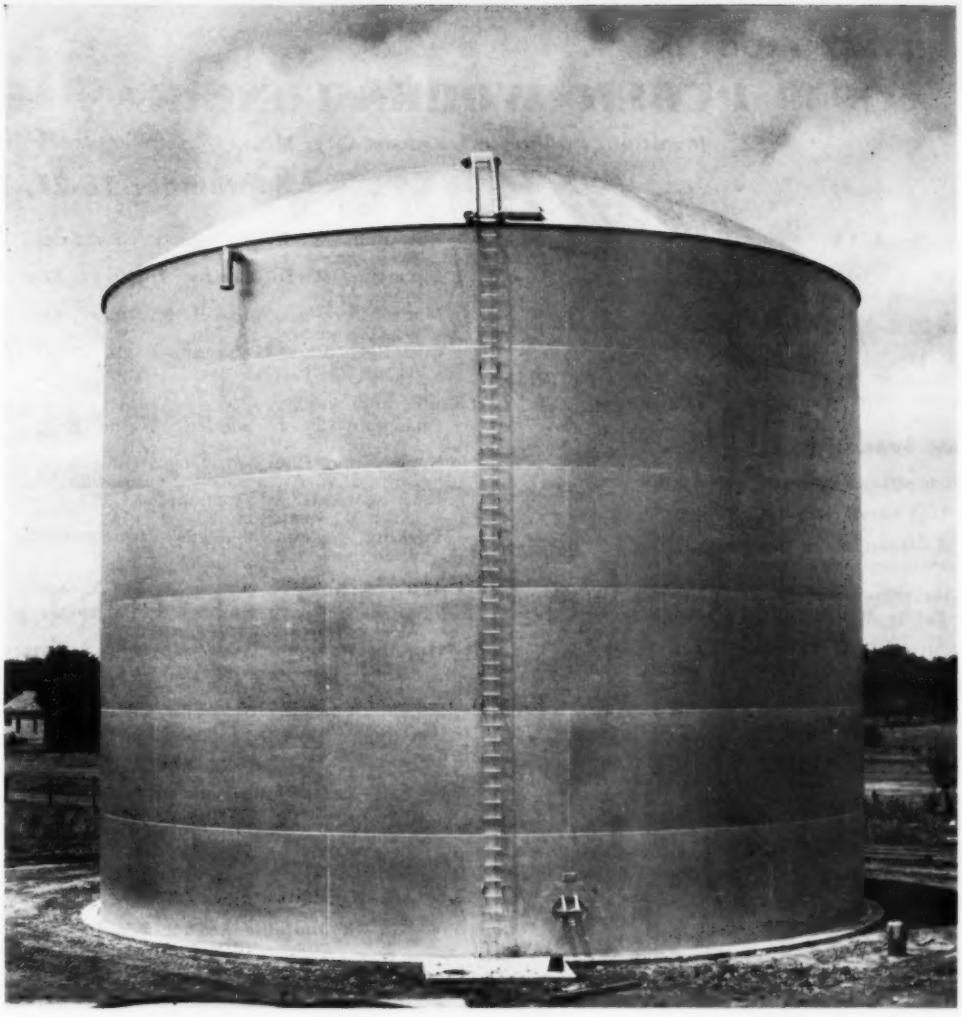
Enlarged granules are drawn off through valve in base—and disposed of as easily as moist sand grains. No messy sludge to get rid of! The softened water, clear and low in alkalinity, is ready for suitable filtration.

Write for details to The Permutit Company, Dept. PW-9, 330 West 42nd Street, New York 18, N. Y., or to The Permutit Company of Canada, Ltd., Montreal.

Permutit®

For over 35 Years Water Conditioning Headquarters

When you need special information—consult the READERS' SERVICE DEPT. on pages 81-85



Million Gallon CLEAR WELL *for Bartlesville*

You undoubtedly know that welded steel reservoirs improve water service in general because of the adequate reserves stored in them. But did you ever consider that this same type of storage may also be the answer to more unusual water service problems? For example, the 1,000,000-gal. Horton reservoir shown above is used as a clear well at a new 4,000,000-gal.-per-day water treatment plant at Bartlesville, Oklahoma. With adequate storage facilities for treated water the plant can be operated at a uniform rate to obtain maximum efficiency. The filtered water in storage also makes it possible to provide continuous service to the 20,000 inhabitants of Bartlesville in emergencies, such as local floods.

Horton ground-level reservoirs also provide large-volume water storage for many municipal and industrial water systems. They are widely used because they are economical to construct and easy to maintain. Regular painting keeps the steel in good condition and welded construction assures water tight joints.

Horton reservoirs are built in capacities up to 10,000,000 gals., while standard capacity Horton elevated tanks range from 15,000 to 2,500,000 gals. Our nearest office will be glad to furnish estimating figures on request.

HORTON

STEEL STORAGE TANKS
...for municipal service

CHICAGO BRIDGE & IRON COMPANY

Plants in Birmingham, Chicago, Salt Lake City, and Greenville, Pa.

Atlanta 3	2123 Healey Bldg.	Los Angeles 14	1508 General Petroleum Bldg
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Chicago 4	2115 McCormick Bldg.	Salt Lake City 1	1539 First Security Bank Bldg
Cleveland 15	2221 Guildhall Bldg.	San Francisco 11	1225-22 Battery St. Bldg
Detroit 26	1536 Lafayette Bldg.	Seattle 1	1339 Henry Bldg
Houston 2	2142 National Standard Bldg.	Tulsa 3	1641 Hunt Bldg

PRELIMINARY PROGRAM

1949 PUBLIC WORKS CONGRESS

Municipal Auditorium, Kansas City, Mo.

September 18-21, 1949

Sunday, Sept. 18

10:00 AM—Registration (Auditorium)
Committee Meetings

1:00-5:00 PM—Tour of Kansas City (Buses leave Municipal Auditorium)

8:00 PM—Get Acquainted Party (Country Club) (Buses leave Municipal Auditorium)

Monday, Sept. 19

(all meetings at Municipal Auditorium)

8:30 AM—Exhibit Review

9:00 AM—Opening of Congress
Welcome and Response

9:30 AM—Panel Discussion—Long Range Planning of Public Works.

Moderator—Gov. Val Peterson, Nebraska.
Federal Viewpoint—J. W. Follin, Asst. Adm., General Services Administration.
The State Angle—I. A. Pasarew, Dir., Md. State Planning Commission.
Place in Municipality—Edmund Bacon, Exec. Dir., Philadelphia Planning Commission.
Opinion of Taxpayer—Mabel Walker, Exec. Dir., Tax Institute.
Economist Analyst—Robinson Newcomb, Council of Economic Advisors.
Conception of Planner—T. Ledyard Blakeman, Exec. Dir., Regional Planning Comm., Detroit.

2:00 PM—Roundtable Session

Public Works Financing
Chairman—Frank Gillelen, Chairman Bd. of Public Works, Los Angeles, California.
Fed. & State Aid—Jos. Mitchell, Comptroller, City of St. Paul, Minnesota.
Serv. Charges—Orin Nolting, Managing Editor, Public Management, Chicago, Illinois.
Long Term Plan—Rollin F. Agard, Director of Finance, Kansas City, Missouri.

Motor Equipment
Chairman—Fred M. Galloway, Town Engineer, Montclair, New Jersey.
Econ. of Equip. Ownership—C. M. Nelson, Editor, Better Roads Magazine.
Preven. Maint.—Col. P. D. Berrigan, Corps of Engineers, U. S. Army.
New Developments—John Moorehouse, Supt., Dept. of Public Service, Highland Park, Michigan.

Refuse Collection and Disposal
Chairman—Warren A. Coolidge, Dir. of Public Works, Nashville, Tennessee.
Legis. Dev. in Grinding—Ralph Taylor, Supt., Waste Collection Div., Cincinnati, Ohio.
Verdier Process—R. A. Williams, Dir. of Public Service, Miami, Florida.
Financing—Henry Taylor, Consulting Engineer, New York, New York.

6:00 PM—Picnic (Buses leave Municipal Auditorium)

Tuesday, Sept. 20

(all at Municipal Auditorium)

8:30 AM—Exhibits Review

9:00 AM—Roundtable Session
Street Maintenance
Chairman—G. R. Thompson, City Engr., Detroit, Michigan.
Financing—J. H. McKay, Highway Engr., Baltimore, Md.
Methods, Equip., etc.—R. McKinley, Dir. of Pub. Wks., Kansas City, Mo.
Cost Recording—G. Sandenburgh, City Engr., Ann Arbor, Michigan.

Traffic and Safety
Chairman—T. J. Seburn, Traffic Engr., Kansas City, Mo.
Survey and Plan.—D. Grant Mickle, Dir., Traffic Engr. Div., Auto Safety Foundation.
Parking Legis. & Financing—G. R. Barton, Engr. Director, Evanston, Ill.
Parking Practices—G. J. Fisher, Traffic Engr., Wichita, Kansas.

Disaster Relief
Chairman—W. A. Bowes, Commissioner of Public Works, Portland, Oregon.
Organization—Burton Washburn, Secretary, California State Disaster Council.
Municipal, State and Federal Relationships—E. L. Knebes, Assistant City Engineer, Milwaukee, Wisconsin.
Financing—W. O. Jones, City Manager, Fort Worth, Texas.

1:00 PM—Equipment Clinic (Special exhibits, demonstrations and events).

Wednesday, Sept. 21

8:30 AM—Exhibits Review (Auditorium)

9:00 AM—Roundtable Session (Auditorium)

Street Construction and Layout
Chairman—Albert G. Wyler, City Engr., New Orleans, La.
Film—Highway U. S. A.—Barber-Greene Company.
Tech. Develop.—C. N. Conner, Principal Highway Engr., Bur. of Public Roads.
Financing—Ralph Graham, Supt., Dept. of Construction, Davenport, Iowa.

Organization, Personnel and Public Relations
Chairman—J. L. Vincenz, Dir. of Pub. Works, County of San Diego, California.
Organization—Herb Olsen, Public Adm. Service, San Francisco, California.
Personnel—Robert D. Stover, State Personnel Director, Minnesota.
Pub. Relations—Lewis M. Wrenn, City Engineer, Pontiac, Michigan.

Street Cleaning and Snow Removal
Chairman—Robert P. Curley, Comm. of Public Works, Boston, Mass.
Preventing Salt Corr.—M. L. Davis, Dir. of Public Service, Akron, Ohio.
Equipment Devel.—Lester Hollis, Supt. of Public Works, Needham, Mass.
Public Cooperation—L. M. Johnson, Comm. of Streets & Elec., Chicago, Illinois.

1:00 PM—Annual Meeting (Auditorium)

2:00 PM—Inspection trip of Public Works Installations. (Buses leave Municipal Auditorium)

2:00 PM—Directors' Meeting (Hotel President)

7:00 PM Annual Public Works Dinner Dance. (Ballroom—Hotel President)

PUBLIC WORKS MAGAZINE

SEPTEMBER 1949

VOLUME 80 • NO. 9

CONTROLLING pH AUTOMATICALLY

PREVENTION of stream pollution was an important consideration in planning the Allentown, Pa., plant of Western Electric Co. Manufacturing processes in this electronics plant produce about 80,000 gallons of waste every day. The waste has considerable acidity, and this must be neutralized before discharge into the Lehigh River.

The problem has been solved by constructing a separate, automatically controlled waste neutralizing system as an integral part of the plant. This system, which has been in successful operation for more than a year, collects all process solutions and, by adding caustic soda under Leeds & Northrup "micromax" control, maintains these wastes at a pH value of 7.0.

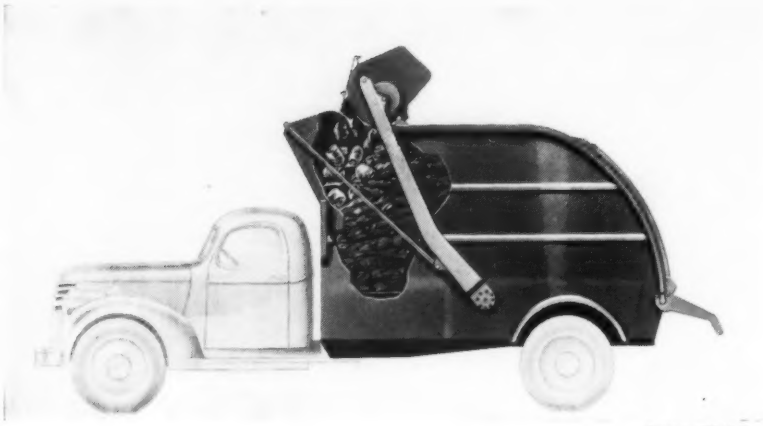
Wastes are predominantly acid and consist of spent plating baths, pickling solutions, acid and caustic dips from the manufacturing and experimental portions of the plant. These wastes are collected in a system of sewers independent of the plant sanitary sewers, and are discharged into a 48,000-gallon settling tank. This performs the dual function of mixing the wastes and of removing suspended matter. An overflow from the settling basin discharges into an 8,000-gallon reaction tank where the wastes are automatically neutralized by the addition of the caustic soda.

Neutralization is accomplished in the following manner: A small amount of the waste in the reaction tank is pumped through an L & N glass electrode assembly which continually measures the pH of the liquid. This operates the Micromax pH controller which records the pH and, through an electrically operated control unit, actuates a feed mechanism so as to add the required amount of caustic for neutralization. Control point is 7.0. Whenever the pH of the waste in the mixing tank drops below this figure, the feeder starts. A 10% caustic soda solution is used for neutralization.

The equipment is so arranged that either the settling basin or the reaction tank can be used while the other is shut down. Sampling lines connect to both; samples may be taken from either tank at any time; likewise, the caustic feed line is valved so it can discharge into either basin.

This is an abstract of an article in "Modern Precision," which is published by the Leeds & Northrup Co.; and the illustration is by courtesy of that company.

● *VIEW of the plant; the reaction tank is in the background.*



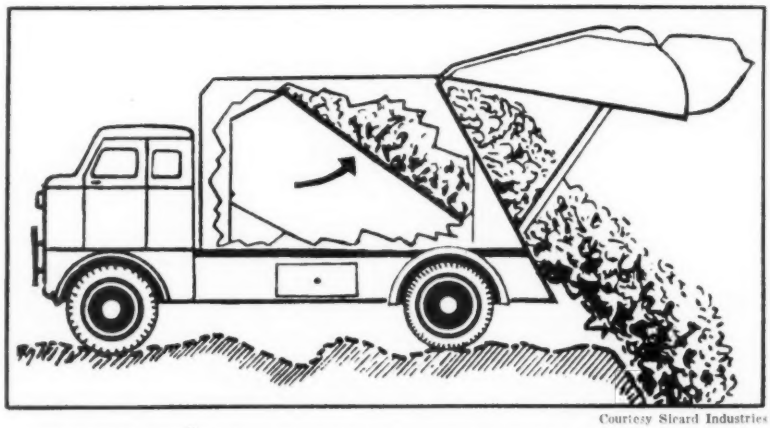
Courtesy Heil Co.

● ***PHANTOM VIEW of a modern garbage body, showing loading. The bucket is in dumping position.***

bage juices and spills materials.

There are on the market a number of specially designed, water tight and sanitary refuse collection bodies. Some of them contain a mechanical device for compacting the refuse as it is admitted, so that heavier loads are possible and fewer trips are necessary. All of them have low loading devices, which ease the burden of lifting and reduce spillage incident to high-lift loading. There are also available bulk containers which are especially valuable for use at hotels and restaurants.

HOW TO PLAN



Courtesy Sicard Industries

● ***THIS CUT-AWAY view shows how power dumping permits unloading at edge of disposal area or on an incline.***

DRY and semi-dry municipal wastes fall into five general classes: (1) garbage, the organic wastes from homes, restaurants and grocery stores; (2) rubbish, including paper, tin cans and all manner of discarded articles ranging from broken crockery and furniture to brush; (3) ashes, resulting from the heating of individual homes; (4) street litter, including paper, leaves and other materials; and (5) the ashes and rubbish from industries and commercial establishments. The methods of planning for collection and disposal of these are outlined, for small communities, in a bulletin prepared by Charles L. Crangle and issued by the Tennessee State Planning Commission, on which much of the material in this article is based.

Garbage, rubbish, ashes and street litter are ordinarily collected and disposed of by the community. In some cities, the sanitation department also services industries and commercial establishments — sometimes at a special charge which may be based on the volume of refuse material to be disposed of; or if they are large producers of refuse, they may be required to arrange for its disposal.

Garbage, because of its high organic content and quick putrescibility, with the creation of odors, must be collected at relatively frequent intervals, especially in the warm months. Refuse can be collected at less frequent intervals without creating nuisance. Daily collection from households is not generally necessary, even for garbage; two or three times a week is normal in most communities. Rubbish and trash may be collected weekly; however, the amount and weight of rubbish may influence the frequency of collection. Proper and regular collections are necessary, both to prevent undue accumulations and to provide an even flow of materials to the disposal plant.

There are three tests that any system of garbage and refuse collection must meet. These are: (1) Does it protect the public health; (2) is it satisfactory to the householder; and (3) is the cost within the resources of the community?

Under the first heading may be grouped the frequency and cleanliness of collection, the containers used, the type of the collection equipment, and the method of disposal. Frequency of collection has been discussed. Cleanliness of collection is difficult to obtain unless a capable superintendent is in charge, a good standard operating practice for collectors is in force, and there is some system for following up complaints. In addition, modern types of collection equipment must be used. It is useless to ask the men to be careful to avoid spillage when the vehicle used by them leaks gar-

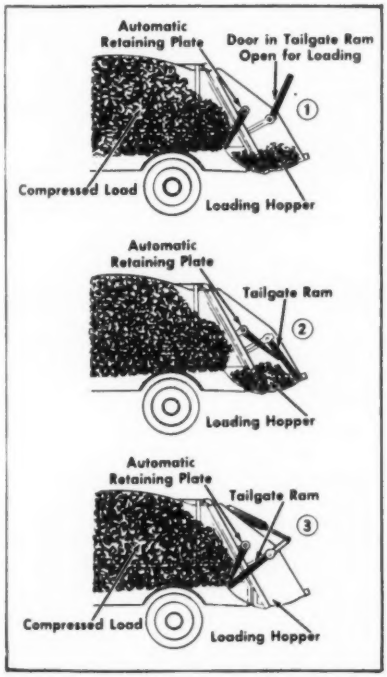
The matter of satisfaction to the householder depends on a number of items. In most cases, the requirement for any kind of a special garbage or refuse can will provoke complaints initially; however, suitable cans are necessary. These should generally be not over 30-gallon capacity, should be tight and must have well-fitting lids. If the collection service is prompt and cleanly, the complaints arising from the requirement for satisfactory containers will quickly disappear.

Where to collect refuse from is another point that must be determined. Collection may be from the curb, from the back door or from the alley. Alley collection is all right where alleys are suitable; this avoids placing unsightly cans along

sidewalks which is inseparable from curb collection. It also avoids the spillage of materials onto the sidewalk or street, either by reason of unsuitable containers or careless handling. A great many communities do not have alleys through which modern collection vehicles can pass readily. In such cases, there is overwhelming reason to provide back-door collection. This costs more, but it is, in most cases, highly preferable to having refuse containers placed along the street front on collection days. Moreover, the average collector will exercise more care to avoid spillage if he collects from the back door than if he collects from the street. He knows that complaints from spillage near the house will be more prompt and vigorous, and he will accordingly take more pains in handling the refuse.

Good containers are a necessity to prevent nuisance, and especially to prevent fly and rodent attraction and infestation. There can be no weak link in the chain of good refuse collection and disposal. The leaky and overflowing container does not incline the collector to avoid spillage; and the leaky and dribbling collection vehicle does not induce the householder to maintain a good refuse container, tight and properly covered.

Large metal containers should be used for restaurants, hotels and business places that produce considerable waste. These are rat proof and can be loaded directly into trucks for disposal, without emptying. In some places it has been found economical to place such containers near hard-to-reach areas; empty household containers into them, and load the filled bulk container directly into open bed trucks.



Courtesy Gar Wood

● ***THE THREE diagrams above show low loading and the method of compressing the garbage.***

REFUSE COLLECTION

The expense of collecting is often the deciding factor in the type of collection service rather than either the health of the community or the satisfaction of the householder. Because of this matter of cost, many small communities permit collection by a private collector, who is interested primarily in the money he can make, and is uninterested and untrained in the public health aspects of his work. He ordinarily feeds the garbage to hogs and disposes of other refuse on open dumps. On the basis of service rendered, prices for such private collection services are high, and the service is often undependable.

Municipal collection is always preferable and is generally cheaper. Sanitation is better controlled. However, some cities prefer to contract with a private collector on a city-wide basis for the removal of all local garbage and rubbish for a fixed amount per year, either a lump sum or a charge per house serviced. This is more satisfactory than the itinerant collector, but it is difficult to insure good service. Because the contract time is usually short, the collector will rarely feel free to invest in good equipment or provide fixed facilities for disposal.

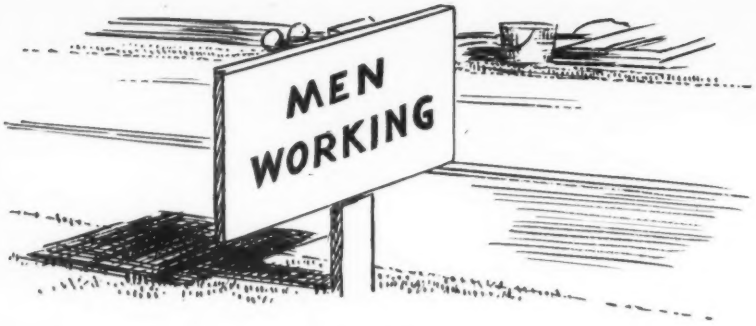
It is generally agreed that the most satisfactory and cheapest method of collection is by municipal forces. While the initial investment for modern equipment may seem large, it costs the city no more than it does a contractor. It is not necessary for the city to make a profit on its collection service, but it is necessary for the private collector or contractor to do so or he will not be in business very long. Therefore, satisfactory collection can usually be made more cheaply by the city.

If community operation of refuse and garbage collection is to be satisfactory, good administrative practices must be employed, with the delegation of authority and responsibility to a single department head. He must have administrative ability and sufficient good employees. A major consideration is the care and upkeep of the equipment. Breakdowns, especially in the small community with few collecting units, can paralyze the collection service. For this reason, there should be a schedule for the inspection, repair and servicing of all equipment. This servicing may be handled in the community garage or by contract. Equipment should be efficient; some of the modern types of collection equipment will load much more easily and quickly and carry a larger load than pre-war equipment. Ease of loading, especially a low lift, will aid greatly in keeping a permanent force of satisfactory workers.

Financing the Work

The simplest method of financing garbage and refuse collection is by general property taxes. This method avoids a good deal of bookkeeping. However, the assessed valuation of the property may have no relation whatever to the amount of refuse collected. Moreover, the user of the property should generally pay for refuse collection, and billing with taxes complicates the matter where rental property is concerned. A few cities incorporate the fee into the water or sewer rental bill. This simplifies clerical work and collection, but there is no close relation between these two services. Selling books of tickets simplifies accounting, but it wastes the time of the collector and slows his work if he is obliged to take up the tickets; also, if the householder is not at home there is a further complication. Separate billing seems to be the most satisfactory method of collection. To insure a high percentage of collections, this should be handled through normal municipal collection channels, and if the fee is not paid it should be a lien on the property. If a fee is charged directly for the service, some citizens will prefer

(Continued on page 62)



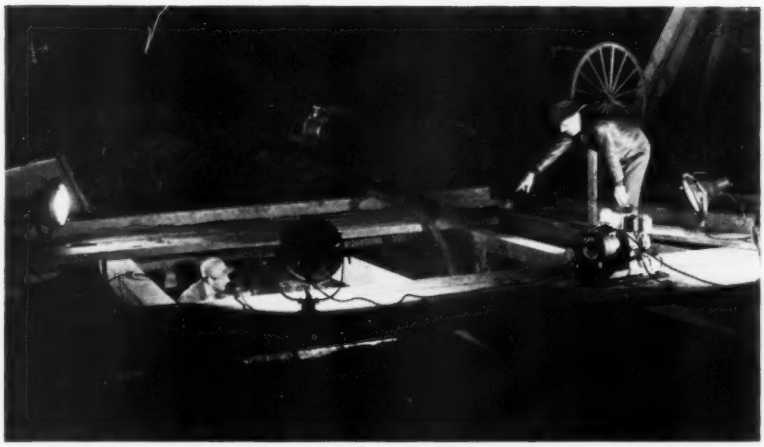
Standard Operating Procedures for STREET OPENING CONTROL

PROCEDURES outlined below for governing and regulating cuts in pavements are based on the rules in force in Detroit, Mich. These were supplied to us by George R. Thompson, city engineer. The material is so presented that it can be written into a specification or an ordinance, or can be used as a basis for general good practice by both city and other personnel engaged in this work.

Permit Requirements

A permit is required for all street openings, including "alleys and other public places." Excepting for such small cuts as those necessary for test holes, emergency repairs and small service connections, all applications for permits must be accompanied by a plan showing the location of the proposed work and the type, size and depth of the structure it is proposed to install. The work must be performed so that traffic is not inconvenienced needlessly, and no more space can be opened at any time than is necessary for the actual performance of the work being done. No opening is permitted before all necessary materials, parts and special fittings necessary to complete the work are on hand and available. Excavated material must be promptly removed and disposed of when not suitable for backfill, or where there is not room for storing such material without causing congestion. When storage of excavated material at the site of the work is permitted, it must be compactly piled, using plank bins or retaining walls, if necessary, to prevent the dirt from spreading over the pavement.

Access to fire hydrants must not be blocked and no dirt or other material can be piled within 15 ft. of a fire hydrant. Gutters and catch basins must be kept open and drainage maintained. If it is necessary to close a gutter or cut off a catch basin, drainage must be maintained by a flume or by pumps. Walks, driveways and building entrances must not be blocked. Two lanes of traffic must be maintained at street intersections. Steel plates of proper size must be provided to cover small paving cuts and to provide crossings over trenches. The steel plates must be securely fastened to prevent movement under traffic.



Courtesy Homelite Corp.

● ***NIGHT WORK is often necessary, and portable floodlights and power units speed and simplify the work, provide power and added safety.***

Safety Measures

Except by specific approval, work is not permitted on main traffic arteries between 7 and 9 in the morning on lanes carrying heavy morning traffic, nor between 4 and 6 in the afternoon on lanes carrying heavy evening traffic. Work may be required on nights, Sunday and holidays if the location requires it in order to avoid undue interference with traffic. If a street must be closed, special permission must be obtained and the Public Works or Police Department establishes a detour or alternate route, but barricades, directional signs, flagmen and other facilities are the responsibility of the contractor or utility doing the work. Adequate, suitable and unobjectionable sanitary conveniences must be provided for the workmen, and these should be approved by the Health Department.

All openings must be protected with suitable barricades, railings and fences and, where necessary, must be covered at night with steel plates or planks. Red lights and torches must indicate all openings and other hazards. Safe temporary walkways, with guard rails must be provided when it is necessary to block or close a sidewalk. Bridges across trenches must be of sound material, adequate in width and strength. All trenches and tunnels must be braced to protect the workmen and the public, and this bracing must be sufficient to protect all surface and subsurface structures and prevent undermining of pavements, curbs or utility lines. Lawns and trees must also be protected from damage. Trees in the line of the opening may not be removed without express permission. A special permit is necessary to use a fire hydrant, and during freezing weather a hydrant pump must be provided and hydrants promptly pumped out. If tunnels are required, all utilities that may be affected must be noti-

fied. Backfill material that may be deleterious to subsurface pipes or structures cannot be used.

Backfilling Cuts and Trenches

During freezing weather and during the period from the first of December to the first of April, backfill must be made with sand or other fine granular material, thoroughly compacted by tamping or flushing, except that the fill over and around gas, water and steam mains for a sand must be compacted by hand-tamping in layers not more than 3 ins. thick or machine tamping in layers not more than 5 ins. thick; compacting by flushing is not permitted, except in unusual cases by special permission.

Backfill around manholes must be made with granular material well compacted by tamping or flushing, except when the space around the manhole is too narrow to permit proper compaction. In such cases, bottom of the pavement slab is made with the broken concrete from the old pavement, well tamped into place. If the cut is made in an asphalt pavement, the portion of asphalt cut out is placed on top of the broken concrete, bottom side up. Voids are filled in such a manner as to prevent scattering of concrete and asphalt over the street surface by the action of traffic. The top of the fill must be ½" to ¾" above the original surface of the pavement.

● ***STREET OPENINGS for water main extensions or repairs must often be made in busy streets, and in restricted space. This illustration, from Chicago, shows the use of barricades and trench jacks. Note the congestion of subsurface structures, with the pipe at right, manhole at left, and other piping.***

Courtesy Dresser Mfg. Co.

● ***STREET OPENINGS often must be sheeted, and driving sheeting is a simple matter with an air compressor.***

Courtesy Le Roi

height not more than 12 ins. above the top of the pipe may be made with thoroughly compacted clay. From the first of April to the first of December, the excavated material, if suitable, may be used for backfilling. Materials suitable for backfilling must comply with the following: Be free from frozen materials; lumps larger than 2 ins. in diameter must be broken up before placing in the trench; moisture content must be sufficient to permit compacting, but wet and soggy materials will not be permitted. All water and mud must be removed from the cuts or trenches before starting backfill. Backfill other than the space should be filled with masonry as the manhole is being built. Tunnels under pavements must be filled with a mixture of sand or gravel and cement, in the proportions of one bag of cement to not over 20 cubic feet of aggregate, the mixture being of a consistency that will hold together when formed into a ball in the hands. Filling shall be by ramming or tamping to fill the area completely. However, gas, water and steam mains may be surrounded with clay to a height of not more than 12 ins. above the pipe.

If the pavement or base is not to be replaced before the street is opened to traffic, the fill above the

Openings and tunnels back of the curb lines on paved streets, and in unpaved streets and alleys, may be backfilled with suitable materials—generally of the same nature as those required for the cut in the street—and must be compacted in the same way. Flushing is not permitted as a method of compaction in any street (except as previously stated), but where permitted elsewhere may be used for all but the topmost 18 ins. of fill.

Replacement of Pavement

Pavement replacement must be in accordance with standard city pav-

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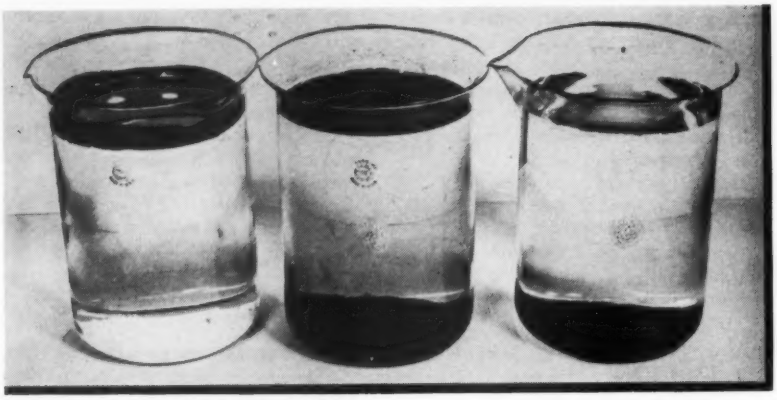


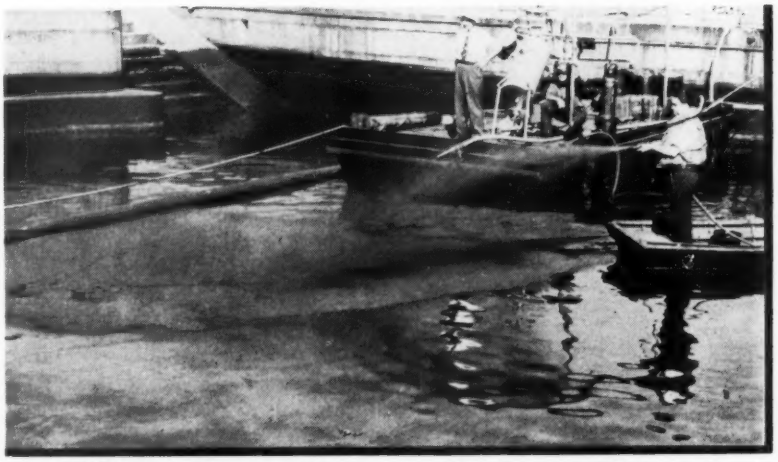
• ***BEAKER DEMONSTRATION:*** ***Heavy slick in left beaker; Carbosand applied in center; no trace of oil at right.***

• ***HAND SPRAY APPLICATOR*** *for use in eliminating small spills. These units are kept in convenient places around the plant for quick use.*

Control of

ROSS E. HOFMANN

Vice President, Carbosand Corporation



• ***APPLYING Carbosand with compressed air and special nozzle. A blanket of sand has been spread and is now ready to sink.***

RECENTLY the sewage treatment plant of a New Jersey village suffered considerable damage when fuel oil was accidentally piped by the truck-driver into a line connecting with a sewer instead of into the home oil storage tank. Before the mistake had been discovered the damage was done; it resulted in an almost complete break-down of the sewage treatment plant. A few months ago at the Army Pier in Oakland, fire broke out near an oil storage area. Before the blaze was stopped several million dollars damage had resulted, largely from floating oil slicks which spread the fire. In another city, one of the largest coal loading facilities on the water-front, and several warehouses were destroyed by fire. According to insurance investigators, oil soaked pilings were responsible for the speed with which the flames spread. In a Great Lakes city recently it was discovered that petroleum products were entering the city water supply, due to spills from a tanker in the vicinity of the water supply intakes.

These examples are not isolated instances of the damage done by oil pollution and contamination. Oil spillages and the floating slicks they cause on the surfaces of rivers, lakes and harbors have become a major hazard in modern industry. From the water surface these slicks spread to water-front structures, polluting piers, pilings, beaches and ships' sides. They add millions of dollars annually to the municipal budgets of water-front cities.

Studying the Problem

Up to the close of the war nothing very practical had been done to combat this problem. In 1945 the Navy suffered severe losses from oil fires, supposedly caused by welders' sparks igniting oil slicks in a pier area. The Norfolk Navy Yard, determined to find a solution to the problem, initiated a research project to determine an easy, rapid, permanent and economical removal method. Every known method was tested but found deficient in some respect.

Finally, a successful method was developed, based on these principles: Oil and oily substances immiscible with, and lighter than, water can be removed from water surfaces by the use of an organophilic and hydrophobic powder. When a powder of this type is deposited on oil, a stable suspension is formed immediately. Due to its pronounced hydrophobic characteristic, the powder when striking the water surface will float until it comes in contact with oil, or until the balanced tension supporting the powder is destroyed by agitation.

Upon contact with oil and the resultant formation of a stable oil-solids suspension, the lighter-than-water oil slick is converted into a heavier-than-water oil-powder suspension, with subsequent submersion and removal from the surface.

The ideal make-up of a powder for this purpose would consist of a finely divided sand to act as an inert base, with a solid coating of carbon for each grain of sand. During 1946,

manufacturing processes were perfected for making such carbonized sand which is called Carbosand; and after a further year of testing at Norfolk and other Navy yards the material was adopted as the standard system used by the Navy in removal of oil slicks. Carbosand is now available commercially.

How to Use Carbosand

Carbosand should be applied to an oil slick in such a way that it is distributed evenly and gently in order to permit the individual particles to bind the maximum amount of oil. In most applications it is spread on an oil surface by compressed air somewhat like the process of spray painting where volume is more important than velocity. This air spraying method should not be confused with sand blasting methods. The latter have as their aim the impinging of sand at high velocity in order to erode a surface, whereas air spraying of Carbosand should have as its aim the gentle depositing of an even but thin sand blanket over an oily surface. A medium air compressor is sufficient as a compressed air source.

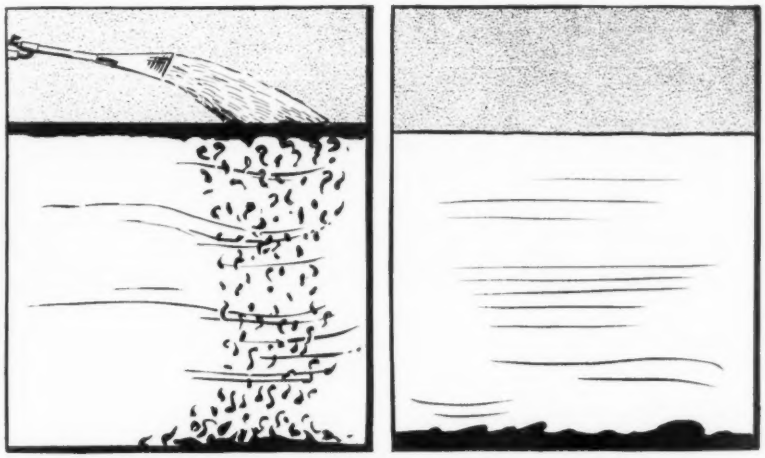
When the Carbosand blankets an oil slick the resultant section can be compared to that of blotting up ink which has been spilled on a level surface. Oil slicks are variable in thickness. After spraying a blanket of Carbosand over an oil slick and allowing about three minutes to pass, some dark spots may be observed, showing an excess of oil in these particular spots. Additional Carbosand should be directed at such spots to absorb the excess oil which has "wet through" the blanket. When no further dark spots are visible, the entire blanket is ready for sinking.

Sinking of the Carbosand - oil blanket may be accomplished readily by agitation. Experiments have shown that a water hose is the best tool for accomplishing this result. As the water strikes the Carbosand-oil blanket, surface tension is broken thus permitting the oil and sand to sink immediately and permanently.

The Carbosand Corporation has approached the problem of oil and grease pollution in sewage treatment from two aspects: first, the floating oil on the surface of settling basins and secondly, emulsified oil floating beneath the surface of the sewage. Where an oil film is present, a fixed spraying mechanism has been developed that continually sprays the surface as the sewage enters the first settling basin. By this method, it is possible to remove almost 100% of this surface film of oil. Oil that is emulsified and floats below the surface is more difficult to attack. To solve this problem, a system of suspending fine mesh Carbosand in the water along with the oil has been developed. The minute globules of oil are attracted to the fine particles of carbon, forming a stable bond. Both the above methods are still in the experimental stage and new designs of equipment are being developed.

The problem of ridding a city water system of oil pollution is simpler. It involves a study of the various intake pipes, the currents and the water conditions surrounding these. The function of Carbosand in this instance is to prevent oil pollution in case an emergency of this nature develops. This means having a stock of the material on hand and the equipment to apply it quickly whenever an oil spill or slick nears the water intake. Permanent special barricades have been developed that may be constructed near the water intake thus reducing the size or spreading area of any slick.

OIL POLLUTION



• *THIS SHOWS the action by which an oil slick is controlled. Carbosand blots up the oil and is then sunk by a water spray.*

Water Front Oil Slick Control

The largest field of work has been in the decontamination of port areas and water-frontages. Experience has shown that speed is the most important feature in minimizing the damage due to oil spills. Because of its high viscosity, a relatively small quantity of petroleum products can cover an enormous area when allowed to float freely on a water surface.

Because oil spills are always emergencies, the best insurance is to have an adequate stock-pile of Carbosand on hand, and spraying equipment available to attack an oil spill within the fewest possible minutes after it occurs. For large spills, the company is developing techniques to confine the oil within a small area by mechanical means that can be utilized very quickly. Suction hoses are used to remove into storage tanks the majority of the oil. Then, when the slick is reduced to normal depth, the job is finished by spraying with Carbosand. This appears to be the most practical and speedy method that has yet been developed.

Spraying equipment available for the distribution of Carbosand includes special nozzles, valves, gun controls, fittings and sand-tanks. For average open-water operation these standard items are adequate. Where the problem is an unusual one, special spraying devices may have to be designed.

CLEANING PIPE LINE

Increases Capacity

92%

• *THE "HYDRAULIC" CLEANER used on the 8-inch line. In 2 hours the cleaner traversed 4,800 feet.*

• *THE "DRAG" CLEANER used for cleaning the 6-inch line and some of the material removed.*

A PORTION of the water supply for Anchorage, Kentucky, comes through a combination 8-inch and 6-inch main which is 5400 feet long and connects with the Louisville, Kentucky, water supply. This main was cleaned during the period March 8th to 11th, 1949.

The project was started on March 8 and a crew of men made the necessary excavations. Due to bad weather, the work was temporarily suspended on March 9. However, on March 10 the preparatory work was completed. This included checking of the valves to insure prompt shut-off and notification of customers affected. The cutting of the 8-inch pipe at entry and exit points for the cleaning machine was also completed on this date.

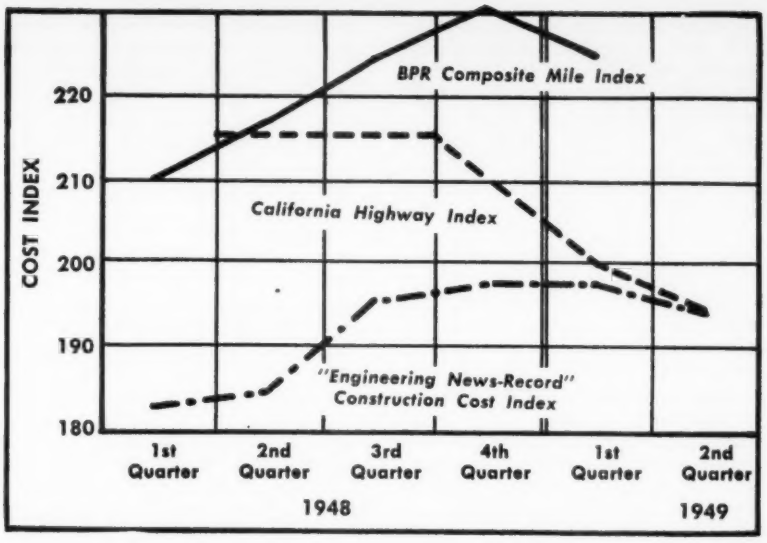
The actual cleaning of the 6-inch and 8-inch lines was done on March 11, the 8-inch line being cleaned first by using the "hydraulic" method. This means that after the cleaning machine had been inserted into the pipe, the water was turned on behind it and the machine was propelled through the pipeline with water pressure. The machine removed the tuberculation accumulated within the pipeline and this material was washed along ahead of the cleaner and emerged with the cleaner at the exit point. Extreme care was taken as to the disposition of the waste water at the exit point so that it would cause no damage. It took two hours for the cleaner to traverse 4800 feet of 8-inch pipe.

That afternoon the 6-inch pipe was cut preparatory to cleaning. The 6-inch line then was cleaned using the "drag" method, which means that the cleaning machine was dragged through the pipe by means of a cable fastened to the 6-inch cleaner. The power to pull the cable and machine was furnished by a power winch. However, the water was turned on behind the machine during the "drag" to insure suspension of the accumulated tuberculation ahead of the cleaner up to the exit point. It took about fifty minutes to "drag" 600 feet of 6-inch pipe.

After the cleaning, the line was properly flushed and put back into service. Dresser Couplings were used on the 6-inch line to speed up the work. As a result of cleaning the lines, the theoretical flow available at the loss of head before cleaning was increased from 270 gpm to 519 gpm, or 92%. The actual terminal pressure flow before cleaning was 12 pounds, with a delivery of 270 gpm. After cleaning, 358 gpm of water was delivered with a terminal pressure of 18 pounds.

B. E. Payne is the Chief Engineer and Superintendent of the Louisville Water Company. The Louisville Water Company furnished all labor, skilled and unskilled, and also the material needed to prosecute the work. The tests were made by the engineers of the Louisville Water Company.

The work was done by the National Water Main Cleaning Company, with Charles Herrings as supervisor. Mr. Pope of the Anchorage Water Company was in charge of the project for the Town



• ***CURVES AT RIGHT** show how costs have declined since last October. Causes for decline, discussed in the text, include greater labor productivity, lower material costs and reduction of uncertainty.*

HOW HIGH COSTS AFFECT

The Highway Program

By **RICHARD H. WILSON**
Assistant State Highway Engineer
HENRY C. McCARTY
Office Engineer
RICHARD R. NORTON
Assistant Office Engineer, California Division of Highways

AN ARTICLE in the March issue of Public Works and the January-February issue of *California Highways and Public Works* on highway construction costs attracted such nation-wide attention and brought forth so many requests for additional information that a "follow-up" article has been prepared to bring the previous data up to date.

Of primary interest is the fact that the California highway construction cost index has dropped from a high of 216.8 (1940-100) for the first half of 1948 to 195.7 for the second quarter of 1949, a reduction of 9.7% from the peak. The decrease appears to be due chiefly to the following factors:

(1) Labor productivity has increased, due to the fact that production is catching up with demand in many industries and there is more competition for jobs. In 1948 labor productivity was estimated at 75%. This figure is now estimated to be 90%, compared to 1940.

(2) Material prices are decreasing for the first time since 1940.

(3) Many of the elements of uncertainty are being eliminated. Materials are becoming definitely available at guaranteed prices and the labor supply is more stable. Contractors are able to reduce contingency items in their bids formerly necessary to cover uncertainties in securing materials and labor.

The greatest decreases in average contract prices from the first half of 1948 to the second quarter of 1949 are: (1) Roadway excavation dropped 23%, from $0.56 to $0.43 per cuubic yard; (2) Class "B" cement concrete pavement dropped 12% from $13.37 to $11.74 per cubic yard; (3) Bar reinforcing steel dropped 12% from $0.094 to $0.083 per pound; and (4) Structural steel dropped 24% from $0.145 to $0.110 per pound.

Since contractors are bidding 9.7% less on highway construction than they were a year ago, an analysis was made of contractors' costs for the first quarter of 1949 to determine the factors which made this reduction possible.

An analysis of a number of projects completed in the first half of 1949 shows a very significant trend in the proportions of the contractors' costs which are going to labor and to materials as compared to similar projects a year ago. The proportion of contractors' costs which go to labor has decreased from 45% (assuming 10% payroll taxes and 10% profit) to 33% due chiefly to the increased labor productivity factor; and the proportion going into materials has increased in the same period from 27% to 37%.

The factor of labor productivity is not subject to exact measurement. It is presently estimated at 90%, compared to the 75% factor used a year ago.

The price index of 186 (1940-100) has been used for the cost of materials for the first quarter of 1949. Although this is based on the latest available information for all materials, it is known that prices of several construction materials are now lower than they were in the first quarter of 1949.

An index of 197 (1940-100) is used for the cost of equipment ownership. This was taken from Marshall and Stevens Index which appeared in the March 17, 1949, issue of "Engineering News Record," and represents the figure for December, 1948.

Using the above factors the Contractors' Cost Index for the first quarter of 1949 is 199.35. This is based on the following: Labor represents 33% of construction cost and the present cost, with 1940 as 100 is 216; the same items for materials

are 37% and 186; for equipment, 25% and 197; and for overhead 5% and 200. Multiplying these out gives 71.28 for labor, 68.82 for materials, 49.25 for equipment and 10 for overhead, or a total of 199.35 as compared to 100 for 1940. The California Highway Cost Index for the same period is 200.4.

The chart shows a comparison between the California Highway Cost Index, the Bureau of Public Roads Composite Mile Index and the "Engineering News-Record" Construction Cost Index for the last 18 months. All indexes are shown with a common base year of 1940-100.

The Bureau of Public Roads Composite Mile Index is higher than the California Index. The Bureau Index is originally based on 1925-29 costs; we have applied a factor to bring the index number to a 1940 base. It would be expected to be higher than the California index, as it is accumulated on a nationwide basis, and we have seen reports from various states showing very little or no decrease at all in construction costs.

Squeezing Out the Water?

Prior to the first of July it was pretty generally believed that the peak in highway construction costs had been passed. However, with recent wage increases (operating engineers 6½c; carpenters 5c; truck drivers 5c; and laborers 2½c), with the unsettled conditions and pending strikes in the steel industry and the railroads, and with the continued Federal policy of operating with an unbalanced budget, it is our opinion that costs will inevitably be held up and possibly increased, and that present inflationary trends will be continued until there is more definite stabilization of the national economy.

The rate of decrease in California highway construction costs was less for the second quarter of 1949 (2.4%) than it was for the first quarter of 1949 (7.4%). The construction cost index published by "Engineering News-Record" has shown an increase in the months of June and July.

It is possible that the recent decreases in construction costs, as based on contractors' bids, was almost wholly due to "squeezing the water out," that is, decreased prices due to elimination of uncertainties in availability of materials and labor and an observed increase in labor productivity, with very little decrease in basic costs. It is our belief that no definite or accurate predictions can be made at this time as to future cost trends.

Highway costs are sensitive to general economic conditions, and the competitive contract system enables the State to secure the full benefit of lower prices due to changes in the general economic condition. The average number of bidders per project has increased to 6.8 during the first half of 1949, compared to 5.1 for the last half of 1948. The average number of bids on structure projects increased from 5.5 for the last half of 1948 to 8.6 for the first half of 1949.

While the decrease in highway construction costs has been definite and has created a great deal of interest, it has not been very large in terms of percentages, and, as brought out in the first article which appeared in this magazine, it still appears that under present conditions it will require approximately twenty years to correct the critical deficiencies in the California State highway system.

Snow Removal in Newton

Newton, Mass., has approximately 300 miles of streets. It plows snow on as many of these as possible and removes the snow from 21 miles of gutter line in the business district. During most winters there is at least one storm in which 12" to 16" of snow falls during a period of 8 to 12 hours. Study of the problem led to the conclusion that there should be sufficient equipment to take care of such a storm, additional equipment being hired when there is an abnormal snowfall. It was estimated that this would require 72 trucks of 1 to 1½-ton and 24 heavy trucks for widening the 16 to 18-ft. width opened by the initial plowing. The city now owns 50 trucks, tractors, etc., suitable for this purpose and the purchase of 38 more is recommended.

Removing snow from the sidewalks presents a difficult problem. It is impossible to bulldoze the snow into the area along the curbs, which is already overloaded with snow plowed from the roadway; moreover the sidewalks are so narrow that no power equipment is available for doing this. The department has contracted for a blower type of equipment to place the snow on lawns in front of private residences.

Champagne Used to Christen Septic Tank

According to a newspaper report, the residents of the Sea Gate section of Coney Island (near Brooklyn) took the sewerage situation into their own hands, becoming impatient with city plans to purify the water front. A "modern" septic tank was installed and four bottles of champagne were poured into it to mark the start of its operation. The tank, which cost $15,000 is expected "not only to keep the water clean around Sea Gate, but to be beneficial to all of Coney Island."

LEADERS IN THE PUBLIC WORKS FIELD

★

Now in charge of sanitary engineering at Massachusetts Institute of Technology, Rolf Eliassen is one of our finest young engineers. He has a flock of degrees, including BS, MS and ScD, but these have not hurt him at all. Previously at NYU, he served with the Corps of Engineers in World War II, reaching the rank of Lt. Colonel.

ROLF ELIASSEN

How OLYMPIA Got a Better Water Supply

● *PUMPING STATION at McAllister Springs, the new source of water supply for Olympia. Spring flow is 20 to 30 mgd.*

HENRY G. PORAK
City Engineer Olympia, Wash.

WATER for the City of Olympia has, for many years, been obtained from artesian wells in a 160-acre valley within the city limits. From these wells the water is pumped to distributing reservoirs and elevated tanks. However, this supply has been jeopardized by the shifting of underlying formations of quicksand on hardpan, strata, which often broke the well casings and silted up the wells. To overcome the difficult problem of maintaining the water supply under these conditions, the city purchased a 260-acre tract about 8 miles northeast of Olympia on which site is located McAllister Springs. These very large springs have a flow of 20 to 30 million gallons of water per day.

The general plan for developing the supply from these springs provides for the pumping, through a 36-inch steel line, of the water from the springs to the Meridian Reservoir which is on a nearby hill about 290 feet above the water level of the lagoon at the springs. From this reservoir the water flows by gravity through a 36-inch reinforced concrete supply line to the existing concrete lined distributing reservoirs in the city of Olympia. From here it reaches the distributing mains by gravity, and is pumped to the steel elevated tanks in various parts of the city.

At McAllister Springs a lagoon has been formed by the construction of an earth dam with an overflow spillway a short distance downstream from the main springs. The water level in the lagoon is maintained at an elevation slightly above the high water level below the dam which is influenced by tidal action.

The dam serves as a tide control works, maintains a pure water supply, without danger of contamination from backwater, and permits sufficient drawdown for the ultimate capacity of McAllister Springs.

At the south edge of the lagoon is located the pump house. This is a reinforced concrete structure, on concrete piles, with sufficient floor space to house ultimately 8 pumps and a surge suppressor. Only 4 of the pumps, which will handle the present demand, are installed at this time. These are two 3000 gpm and one 2000 gpm Fairbanks-Morse horizontal shaft pumps, and one Peerless 3000 gpm vertical shaft pump. These are equipped with motors operating automatically in conjunction with a float switch at the Meridian Reservoir. These pumps operate against a head of 281 feet and will supply a minimum of 10 million gallons of water per day.

The water is pumped from the McAllister Springs lagoon to the Meridian Reservoir through a 36-inch coated and wrapped welded steel pressure line 5/16" in thickness and 3700 feet in length.

Meridian Reservoir

The Meridian Reservoir is a 2-million gallon reinforced concrete lined reservoir about 290 feet above the water level of the McAllister Springs lagoon and about 67 feet above the water level of the distributing reservoirs in Olympia. This reservoir, located on the top of a hill, is entirely in excavation, following approximately the contours.

To prevent birds landing on the water surface of the reservoir, a wire grid system is constructed above the water surface. The wire used is No. 6 solid hard drawn copper wire anchored to the concrete

● *INTERIOR of the McAllister Springs pumping station, showing four pumps now installed. There is space for 8 pumps.*

● ***VALVE HOUSE and elevated tank at the City Reservoir.***

walls of the reservoir. A space of one foot is allowed between the upper and lower cross wires to prevent contact.

At the Meridian Reservoir is located a valve and chlorination building. Three 36-inch electric-motor-operated gate valves control the by-passing of the reservoir to the gravity supply line when the reservoir is being cleaned. Here also is installed a Venturi meter to measure the flow from the reservoir to the supply line. This measurement also serves to control the amount of chlorine going into the system. All pumps at the main pumping station are controlled from this point by means of a multiple circuit float switch. An additional float switch is provided on the gravity line breather to prevent undue pressures during the periods when the reservoir is by-passed.

The chlorinating equipment and chlorine cylinder hoists are located in this building. The chlorinating equipment consists of two chlorinators of the automatic control solution feed vacuum type. The rate of feed is automatically controlled in proportion to the flow of water through the meter. The building is equipped with space heating equipment.

Supply Line

The supply line, 7.2 miles in length, from the Meridian Reservoir to the distributing reservoirs in the city, consists of 36-inch centrifugally spun concrete pressure pipe made by the American Pipe Company processes. The supply line is designed for working pressure heads designated as classes 120, 140, 160, and 190.

The pipe sections are 12 feet in length reinforced with two cages of helically wound steel rods, properly spaced and supported with longitudinal reinforcing. The pipe was manufactured by the American Pipe and Construction Company of Portland, Oregon and Los Angeles, California, in their own portable fabricating plant set up at Lacey, about midway on the supply line between Olympia and the Meridian Reservoir.

At highway crossings the 36-inch supply line was threaded through a 42-inch reinforced concrete culvert pipe. Under railroad tracks steel pipe was imbedded in concrete.

To form the joints between the steel and the concrete sections, a steel adapter assembly with a filler plate was welded to the steel pipe and surrounded with a concrete collar to form the bell end of the pipe. The joint with the concrete pipe section was then made in the same manner as between concrete sections. The bell end of the concrete pipe is forced at the plant by installing a steel joint ring 3/16" x 9" with a rubber gasket fitted in the groove of the pipe to form a water tight joint. Reinforcing mesh is wound around the steel ring and surrounded with a cement mortar collar. The field joint is then formed in the usual manner for this type of pipe by pressing a rubber gasket in the groove in the spigot end of the pipe, buttering the end of the pipe with cement mortar and forcing the joints of pipe together. The field joint is then grouted on the outside of the pipe and the joint on the inside of the pipe is pointed up with cement mortar.

Valve House at City Reservoir

A valve house was constructed at existing city reservoirs at 8th Avenue and Fir Street to control the water level in either of the two reservoirs by means of a 16-inch cone valve and control equipment; to permit the by-passing of either reservoir; to shut off the gravity supply line when and if necessary; and to prevent possible surges in the gravity line.

The cone valve has an adjustable closing period within a range of one to eight minutes. The primary control device is adjustable through at least 5 steps which automatically vary the opening of the cone valve with the decrease or increase in water level in the reservoir. The flow through the valve therefore, increases as the water level in the reservoir decreases and the reverse.

There are also installed in this valve house two 24-inch motor operated gate valves, and two 24-inch and one 12-inch manually operated gate valves. All have a working pressure of 150 lbs.

Connections are made from the supply line to the existing distributing reservoirs through 24-inch steel water lines encased in a 36-inch diameter steel pipe jacked through the reservoir embankments.

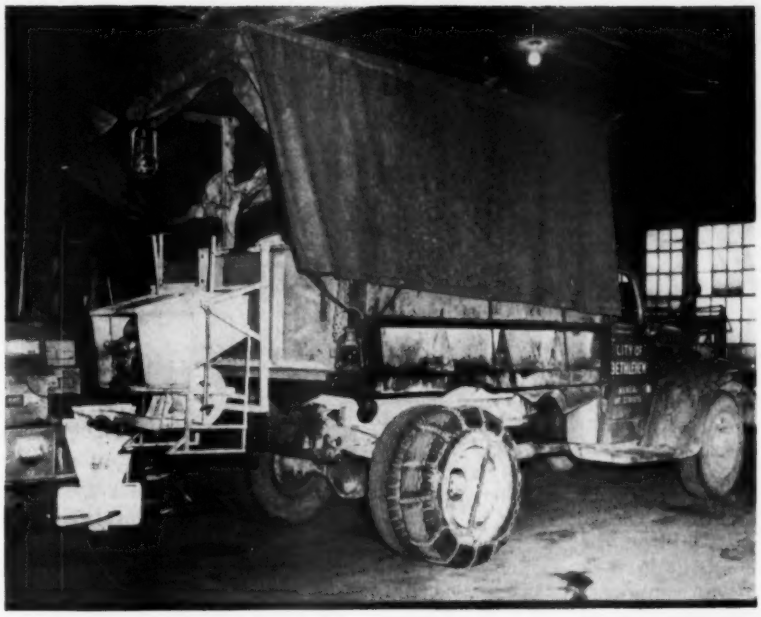
The installation of the permanent transformer at the main pumping station and the electrical control device was completed in May, 1949, although the city has been obtaining water through the new system since July, 1948, by using one of the four pumps, and a temporary power hook-up.

The contract for the 36-inch steel pressure line and the 36-inch reinforced concrete gravity supply line was carried out by the American Pipe and Construction Company of Los Angeles, California, at a cost of $805,133.55. The contract for the pump house, pumping plant, the Meridian Reservoir, the control house and the valve house in the city was performed by Scheumann and Johnson of Seattle, Washington, at a cost of $498,000.

Officials of Olympia are: Ernest Mallory, Mayor; Dan McCaughn, Commissioner of Finance; Thos. I. Evans, Commissioner of Public Works; Henry G. Porak, City Engineer; and Guy Myatt, Water Superintendent.

The consulting and designing engineers for the work were James W. Carey and Associates of Seattle, Washington.

● ***MERIDIAN RESERVOIR, showing valve and chlorination building.***



• The "Covered Wagon" which Bethlehem maintains ready to go whenever snow or ice threatens. Description in text.

GEORGE H. REUSSNER
Director, Department of Streets and Public Improvements, Bethlehem, Pennsylvania

Bethlehem's BEST SNOW REMOVAL JOB

LAST winter, which was the most severe that we have had in a long time, the Bethlehem "Globe-Times" published an editorial complimenting the Department of Streets for doing the "best snow handling job in the last 20 years." "The new post-war efficiency of the Streets Department is manifest particularly on downtown traffic lanes, which have been kept in usable condition since the first snowfall before the turn of the year," the editorial stated.

Last winter, for the first time, we spread rock salt on our streets. We found that it cut skidding accidents considerably, kept traffic moving, and enabled us to remove snow and ice more economically than we had ever been able to do before. It worked so well that at first the people couldn't understand what we had done to give them a bare pavement so quickly after a storm had stopped.

At the beginning of last winter we built a covered wagon, which became a familiar sight on our 100 miles of main streets during and after storms. It is one of our regular trucks, with a frame over the bed and a tarpaulin fitted over that to keep the men and the rock salt dry when they go out during a storm.

We have found that it is essential that they do go out while the storm continues. Time is an important factor, for if we work effectively during a storm we can give the public safe streets almost as soon as it's over; the snow never has a chance to pack and freeze, and ice doesn't form under those conditions.

To the "covered wagon" we attach a Tarco "Scotchman" automatic spreader. We drive the wagon down the center of the street and spread rock salt on both sides at once—another effective method of saving time and covering our routes quickly. We have a number of hills in Bethlehem and several through highways. Traffic is always heavy, but we no longer have to worry about accidents during storms. And neither do the truckers. One driver told us that he didn't use any chains at all last winter in the city, and others have reported that they no longer have any difficulty with our hills.

In another effort to save time we keep our "covered wagon" loaded with rock salt all of the time. At the first sign of a storm our men have been instructed to report to headquarters. As soon as the snow reaches a depth of half an inch, they go out, spreading the salt first on the downtown area, then going on to other heavily traveled sections of the city. We have several "nuisance snows" every winter, when just enough fall comes down to make the streets dangerous. Last year we found that rock salt got rid of them quickly, with the result that we didn't have to plow. That is one of the reasons for the "post-war efficiency" that the Globe-Times mentioned — and for greater economy in our operation, too. Even when it is necessary to plow the heavier snows, the use of salt saves money for us because it removes part of the fall and keeps the remainder from freezing and packing, so that, when the plows come through, the job is easier for them.

In previous years when we used only cinders on downtown streets, we had to keep putting them down

(Concluded on page 65)

342 CITIES *tell what is their Most Useful Equipment*

"What particular type, kind or piece of equipment do you find most useful in city construction and/or maintenance, and why?" was the question asked of city engineers in a recent survey conducted by this magazine. Replies numbered 1,393, and 442 votes were recorded for the most useful equipment.

MOTOR graders, patrols and maintainers received most votes, with a total of 133; surprisingly close behind were tractor front end and other loaders, with a total of 102 mentions. Power shovels, draglines, backhoes and trenchers were third with 40. These were followed in order by: Bulldozers, with 37; air compressors, 23; sewer cleaning equipment, 19; truck or tractor-mounted cranes or hoists, 18; street sweepers and flushers, 16; distributors and maintenance kettles, 12; and pavers and spreaders, leaf loaders, underbody planers, portable pumps, and sand or cinder spreaders. Many mentioned trucks as being most indispensable; tractors were mentioned a great many times, but ordinarily in connection with bulldozers, loaders or other equipment. Both trucks and tractors are therefore omitted from the tabulations as separate entities.

These replies are of interest in comparison with a similar survey made of county engineers, which was reported in our December, 1948, issue. In that survey, motor graders were also first, and front end and other loaders second; but from there on the order was different. However, both surveys show clearly the great utility and economy of modern equipment in construction and maintenance work.

Some of the typical comments by city engineers, city managers and superintendents of Public Works follow. These are classified according to the kind of equipment, and only a small proportion of the comments received are reported, both to save space and to avoid repetition. The comments herewith are selected primarily to show especially useful or unusual methods of solving construction and maintenance problems with equipment.

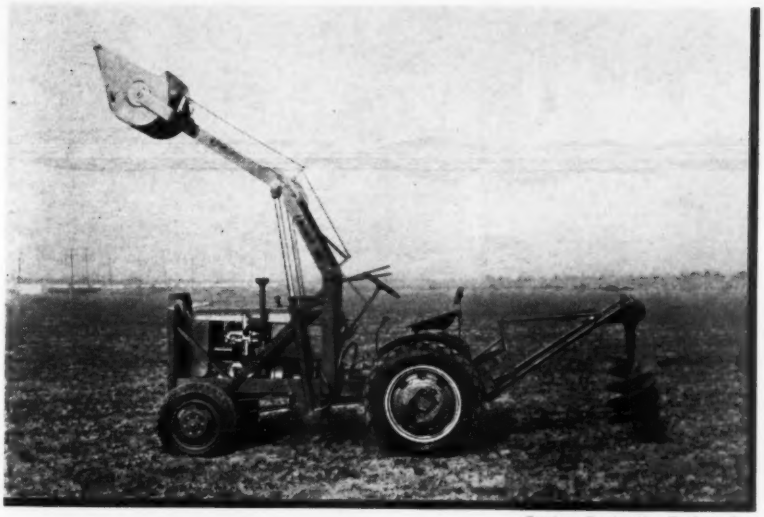
Motor Graders, Patrols and Maintainers Are Versatile

A motor patrol is most valuable, due to its versatility and ability to do many kinds of work—W. E. Kennedy, City Engineer, Inglewood, Calif. A motor grader does many jobs economically—G. W. Stevens, City Engineer, Torrance, Calif. Our motor patrol combines ease of operation with power to spare and is excellent for solving road maintenance problems—Henry Rolfes, Jr., City Manager, Golden, Colo. Our motor grader because of the amount and the different types of work that it can do—J. R. Kasper, Jr., First Selectman, Plymouth, Conn. The road patrol permits us to take better care of our streets and alleys—C. R. Allen, City Manager, Winter Park, Fla. We use our motor patrol for preparing subgrades for new construction, and for maintaining unimproved streets and alleys—W. F. O'Connor, City Engineer, Anderson, Ind.

Motor maintainers can be used for light grading, for spreading road materials, for maintenance and for snow removal—W. W. Massey, City Engineer, Ft. Madison, Iowa. We use our maintainers not only for dirt streets, but also for backfilling ditches, for snow removal and for other purposes—Martin Taylor, City Clerk, Villisca, Ia. The grader is most useful because of its versatility, as we can use it for grading, maintenance, ditching and snow plowing

Courtesy Ottawa Steel Products, Inc.

O'Connor, City Engr., Anderson, Ind. —Leroy Trafton, City Manager, Sylvan Lake, Mich. Our patrol is used for snow plowing, gravel road maintenance, mixing bituminous materials, and similar work—J. C. Adams, City Engineer, Crookston, Minn. A small motor grader and a front-end tractor type loader make a fine combination, and are used for maintenance, street repair, materials handling, snow removal and construction—E. E. Gamet, City Manager, Slater, Mo. We use our motor grader to maintain our considerable mileage of gravel streets and alleys, and also for snow removal, street maintenance and other work—R. C. Fargo, City Engineer, Glasgow, Mont. A road maintainer equipped with a dozer blade—Sam B. Ward, City Engineer, Dillon, Mont. We use



Courtesy Construction Products Corp.

● ***HERE ARE THREE of the many fine front-end loaders. Above is the Profit, with auger attachment; below is a Hough 1-yd. on an IHC tractor excavating for water mains; opposite is a hydraulic bucket Ottawa.***

Courtesy International Harvester Co.

our motor patrol for maintaining gravel streets, excavating for curb and gutter, backfilling trenches on sewer jobs and pulling trees—C. J. Dodson, City Engineer, Sparks, Nev.

Our road patrol grader is the most valuable; it is used for maintaining streets, excavating for curbs, plowing snow and grading—W. D. Clark, Street Commissioner, Massena, N. Y. We find the grader-maintainer most useful for small municipalities, especially when equipped with scarifier and front end lift—A. L. Weisenberger, Engineer, Allentown, Pa. Our power grader with scarifier is used for more types of work than any other equipment, including maintaining streets, cleaning gutters, and removing snow—D. F. Harvey, City Engineer, Beaver Falls, Pa. Most of our streets have no curbs and the gutters must be maintained; we use our motor graders for this and also for new construction—J. M. Orman, City Engineer, Bryan, Tex. We find the motor grader with front-end loader most useful because of its versatility—Casey Fannin, City Manager, Sweetwater, Tex. We use our power maintainer for light road work, and the broom and power mower attachments are very useful —W. T. South, City Manager, South Salt Lake, Utah.

All City Departments Use Front End and Other Loaders

A few of the 102 comments on loaders follow: We have a hydraulic loader on a wheel tractor, which we use all during the year for dirt loading; snow removal; and cinder, gravel and coal handling; it will dig as well as scoop—Loren Heiple, City Engineer, Boone, Ia. Front end loaders are most useful because of versatility and adaptability to numerous jobs—A. A. Rhomberg, City Manager, Dubuque, Ia., and also W. N. Baxter, City Manager, Larned, Kans. Our loader excavator can be used by all departments of the city for dirt moving, traction, raising and lowering heavy articles, laying pipe, etc.—C. F. Breeden, City Manager, Winfield, Kans. Our front end tractor loader is most useful because it saves labor and can be used for backfilling and many other operations—F. Lloyd Peters, Street Commissioner, Ithaca, Mich. Our front end loader is useful in street maintenance, street cleaning, snow removal, beach cleaning and beach grading—C. B. Middletown, City Engineer, Wildwood, N. J.

Our crawler-loader-dozer is handiest; its small size makes work in alleys easy; with grubbing attachment to dozer blade, it handles clearing of new streets easily—C. B. Morgan, City Engineer, Deming, N. M. Our loader has proven quite satisfactory for highway, ditching and fill work, and also on the dump—John Walpole, Sup't. Streets & Water, Groton, N. Y. Our snow and materials loader is used practically all the year around for one type of loading work or another—Leon H. Cass, City Engineer, Ithaca, N. Y. We find our loader most useful for snow removal and for maintaining shoulders and ditches where there is no curb and gutter—F. E. Huston, Sup't. of Public Works, Owego, N. Y. We use our tractor loader for loading trucks with stone, gravel and cinder; for backfilling trenches; and with a hook for laying pipe and setting hydrants—C. E. Pollock, City Engineer, Coatesville, Pa. Our tractor loader is used for loading street materials, sweeping cover stone, cleaning streets, laying pipe up to 24-inch, spreading and grading, and lifting heavy materials—J. F. Hudson, City Manager, El Campo, Tex.

Power Shovels, Draglines, Power Hoes and Trenchers Save Money

Our dragline with backhoe and clamshell attachments is useful in trenching, cleaning ditches, unloading material from cars, excavating and loading material—R. H. Davis, City Engineer, Cordele, Ga. Our truck-mounted crane lays pipe, digs trenches and loads trucks—D. D. Hankins, Jr., City Engineer, Savannah, Ga. Our power shovel with dragline, clam bucket and trench hoe attachments is most valuable because it saves us many hours of

manual labor—E. L. Neumann, City Manager, Manistee, Mich. Our ½-yd. rubber mounted power shovel is one of the most versatile and most used pieces of equipment; we use it for grading, loading trucks, sewer construction, etc.—R. E. Monson, City Engineer, Rochester, Minn. We consider a rubber-tired wheel tractor-mounted crane-dragline to be the most useful equipment—J. H. Bender, City Engineer and Manager, Tucumcari, N. M. Our power shovel with back hoe and crane attachments is most useful—T. C. Adams, City Engineer, Greenville, S. C. Our half-yard dragline, with all of its attachments, is most useful—J. S. Williams, Director of Public Works, Bay City, Tex.

Other Equipment Favorites

An air compressor, because of its multiple uses, is probably the most valuable equipment for a small city—B. H. Maynard, City Engineer, Sonora, Calif. The air compressor is essential for rock excavation and pavement cutting—F. G. Doggett, City Engineer, Mount Airy, N. C. Our air compressor is used to break up pavement, blow dirt out of pavement cracks and flush hydrants—W. A. Montgomery, City Engineer, Bexley, Ohio. The portable air compressor has a diversified use in street and utility maintenance—R. L. Burmeister, Boro Manager, Ashland, Pa. Our air compressor and tools are especially valuable for street openings, cutting roof drain channels through curbs, tamping, etc.—W. E. Rosengarten, Twp. Engineer, Lower Merion Twp., Pa. We find our combined tractor and 105-ft. compressor, with backfill blade, most useful—P. B. Noftsker, Boro Sup't., Shippensburg, Pa.

Our bulldozer, which we use to bury garbage, clear land and prepare streets for paving, is very useful—G. S. Ratterbury, City Manager, Deland, Fla. Our street sweeper does an excellent job—Edward Hand, City Clerk, Oglesby, Ill. Our street sweeper keeps our improved streets cleaner at lower cost—C. W. Garner, City Clerk, Salem, Ill. Our distributor is most useful because we have 27 miles of asphalt surface streets—D. C. Wesche, City Engineer, Manhattan, Kans. For a small city, tractors with several attachments, changeable as needed to bulldozer, sweeper, plow or loader are most valuable—E. B. Lane, Municipal Manager, Grosse Pointe Park, Mich. A trenching machine is best because of the labor it saves—S. H. Smith, Sup't. of Public Works, South Haven, Mich. Our bituminous distributor for maintenance and construction of streets—F. W. McKellip, City Engineer, Faribault, Minn. The asphalt paver and finisher—John E. Maring, City Engineer, Kansas City, Mo. Our vacuum leaf loader speeds up street cleaning and saves money—I. Russell Riker, Engineer, Princeton, N. J. Our sewer cleaning equipment is most useful in keeping our sewer system operating—Byron Minnoe, Commissioner, Baldwinsville, N. Y. Our asphalt plant is most valuable because we can produce material for maintenance as needed—J. J. Lynch, Commissioner of Boro Works, Brooklyn, N. Y. Our power bucket machine and sewer rods eliminate hard work and are very efficient—C. P. Nicholson, Village Engineer, Hamburg, N. Y. Our sewer cleaning equipment, which is very easy to handle and permits men to work above ground—J. C. Adams, Engineer, Johnson City, N. Y. Our snow loader, because we can use it on leaves and snow; also our sewer cleaning outfit which enables us to keep sewers open that otherwise would have to be dug up and relaid—A. T. Ernenwein, Commr. Public Works, Oneida, N. Y.

Courtesy International Harvester Co.

• ***THIS Bucyrus-Erie loader, mounted on an International tractor, is being used as a bulldozer for making a shallow fill.***

Our wheeled tractor with front end loader, front and rear blades, mower and sweeper attachments, has been very satisfactory—R. C. Howard, Village Engineer, Wellsville, N. Y. Our garbage packer has accomplished more at less cost than previous methods—P. A. Roberts, City Engineer, Lumberton, N. C. A dump truck equipped with underbody blade, salt distributor and snow plow; we use it for grading, spreading salt or calcium chloride, plowing and removing snow with one man—H. F. Hay, Safety Service Director, Ravenna, O. Our small bituminous distributor speeds up street repair and makes it possible to do work at a considerable saving which we formerly contracted—F. H. Connors, City Engineer, Van Wert, O. We use a small tractor very effectively to cut weeds, plow snow, harrow ground, cut up dead trees, push leaves into piles, etc.—W. E. Rosengarten, Twp. Engr., Lower Merion Twp., Pa.

We use a utility spray tank on a trailer for pumping from railroad cars to tank or barrels, from tank to barrels, shooting 10-ft. strip on construction or resurfacing, and with a hand spray for patching—H. T. Knoell, Town Manager, Orange, Va. We have a tractor with hydraulic loader, mowing machine and utility blade, which is light, versatile and simple to operate—W. F. Johnson, City Engineer, Clarksmont, Wash.

The Most Useful Equipment for Cities According to 342 City Engineers

Maintainers & Motor Patrols	133
Tractor, Front-End and Other Loaders	102
Draglines, Power Shovels, Backhoes, Trenchers	40
Bulldozers	37
Air Compressors	23
Street Sweepers & Flushers; Leaf Loaders	22
Sewer Cleaning Equipment	19
Truck or Tractor Mounted Hoists & Cranes	18
Bituminous Distributors and Kettles	12

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Designed by: Warren and Van Praag, Decatur, Illinois

Lakeside Aero-Filter Serving Paris, Ill., Well For Over 10 Years

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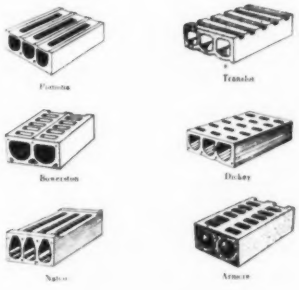

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When you need special information—consult the READERS' SERVICE DEPT. *on pages 81-85*

ORGANIZATION FOR STATE-WIDE *Snow and Ice Control*

B. W. DAVIS
State Maintenance Engineer, North Carolina State Highway and Public Works Commission

The data herein are based on the maintenance manual of the North Carolina State Highway and Public Works Commission.

PROMPT removal of snow from the surface of those roads on which the volume and type of traffic warrant this treatment is sound winter maintenance policy.

Since it is almost impossible to plow the pavement bare, the thin layer of packed snow will often glaze over and cause an icy condition similar to that produced by sleet or freezing rain. Ice which forms on the pavement must be treated to prevent skidding. The application of abrasive material, either alone or in combination with calcium or sodium chloride, is the most common method of treatment. The pavement should be treated whenever slippery conditions exist and for as long a period as necessary. On primary roads, all grades, curves, intersections, bridge floors, bridge approaches, and other danger points should be treated immediately after icy conditions develop. Often during a cold rain bridge floors will become coated with ice before there are any signs of ice elsewhere. This condition should be anticipated when possible and abrasives spread on bridge floors as early as practical. If labor, equipment and materials are available, it is advisable to treat the entire lengths of the more important primary roads. If the abrasives whip off, the road should be re-treated as often and for as long as the slippery conditions exist. Adequate treatment of icy pavements is sound economy and materially adds to the safety of the highway.

On secondary and tertiary roads the amount of ice treatment depends upon the importance of the route, the geographic location and the type of traffic. On secondary routes it is advisable to apply abrasives on steep grades, sharp curves and other danger points. On roads where traffic is light it may be possible to use untreated abrasives. Ice treatment of tertiary and other less important roads is a local problem and should be handled according to the needs of existing conditions.

Assignment of Men and Equipment

Definite assignments of men and equipment should be made, with a predetermined responsibility for sections of roads and a plan for progressive snow removal. Remove snow from the pavement on the main or heavy traffic routes first; the pavement on other roads that have a bituminous surface treated wearing surface should come second; and school bus and mail routes, not included in the roads referred to above, should be given the next priority. Snow plowing and ice control work should continue through incorporated municipalities where we maintain the streets that are an extension of the road systems.

As soon as practical after the traveled portion of the roads is cleared, snow should be removed from the section of the shoulder adjacent to the pavement in order to prevent melted snow from saturating the subgrade under the pavement edge. The removal of snow from shoulders is more important on surface treated roads than on roads with higher type pavement.

All "Safety Rules and Regulations" (our instructions paragraphs 4 through 7) relative to the use of red flags, reflectors, clearance lights, etc., should be observed. Precautions for the safety of the traveling public and of our men cannot be too strongly impressed on our forces.

Abrasives, Chemicals and Equipment

Centrally located stockpiles of sand, screenings, cinders, or other abrasives should be provided prior to winter weather. Smaller quantities of abrasive materials should also be kept in stockpiles near steep grades, sharp curves, bridge approaches, and other points where there is reason to anticipate trouble from ice on the pavement.

A sufficient stock of chlorides should be secured to take care of your anticipated needs.

Tire chains of the proper size and in sufficient quantities should be on hand at your storage sheds. Snow plows and equipment should be checked prior to winter weather to see that they are in operating condition and are complete with the required lights and reflectors. Crawler tractors should be stored near locations where snow drifts are anticipated.

Snow and ice control is exceptionally hard on equipment. The operators should be cautioned and required to avoid abuse to equipment and to protect it as much as possible.

Abrasives

Local availablity and unit cost determine the type of abrasive to be used.

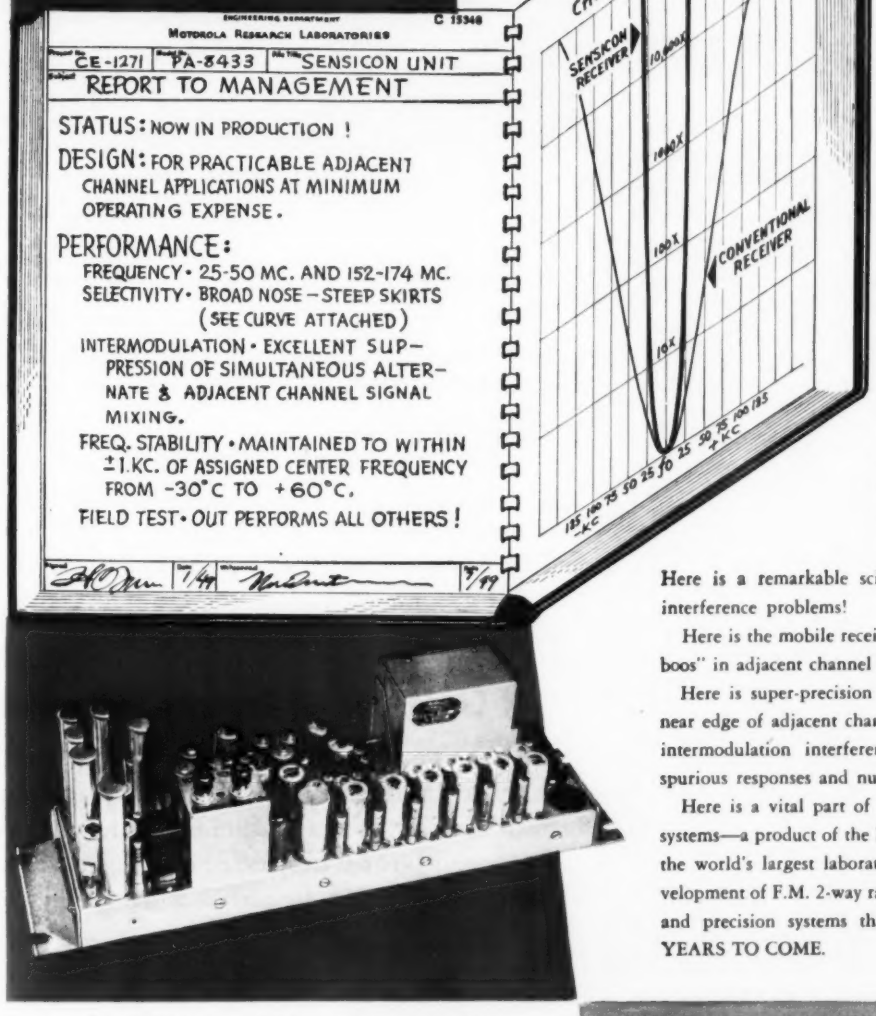
Sand.—Sand containing an excess of fines does not provide good traction, and coarse material is likely to whip off and is, therefore, not effective in combating the skid

(Continued on page 64)

Motorola "RESEARCH" LINE...the *only* 2-way radio equipment incorporating the amazing

SENSICON circuit

100,000 TIMES IMPROVED SELECTIVITY—
MAXIMUM INTELLIGIBILITY—MINIMUM MAINTENANCE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10,000X
1000X
100X
10X
125 100 75 50 25 0 25 50 75 100 125
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+KC

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communications than ever before with this *new*

ADJACENT CHANNEL RECEIVER

ALL IN ONE PACKAGE, THESE ENGINEERING ACHIEVEMENTS SET NEW PERFORMANCE STANDARDS

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A typical P&H Crane installation in an incinerator. Here, the two P&H Incinerator Cranes are shown charging the hoppers.

Equipped with 2 cubic-yard buckets, these two P&H Cranes maintain a high, constant flow of refuse into furnace charging hoppers.

In keeping with the plan to make the Betts Avenue incinerator America's most modern and efficient, New York City chose P&H Cranes for the most advanced refuse handling equipment.

Two 5-ton P&H Traveling Cranes with 3-yard grab buckets will serve this plant which will have a daily capacity of 800 tons. They are engineered specifically for the requirements of this destructor—to provide fast, flexible, low-cost service.

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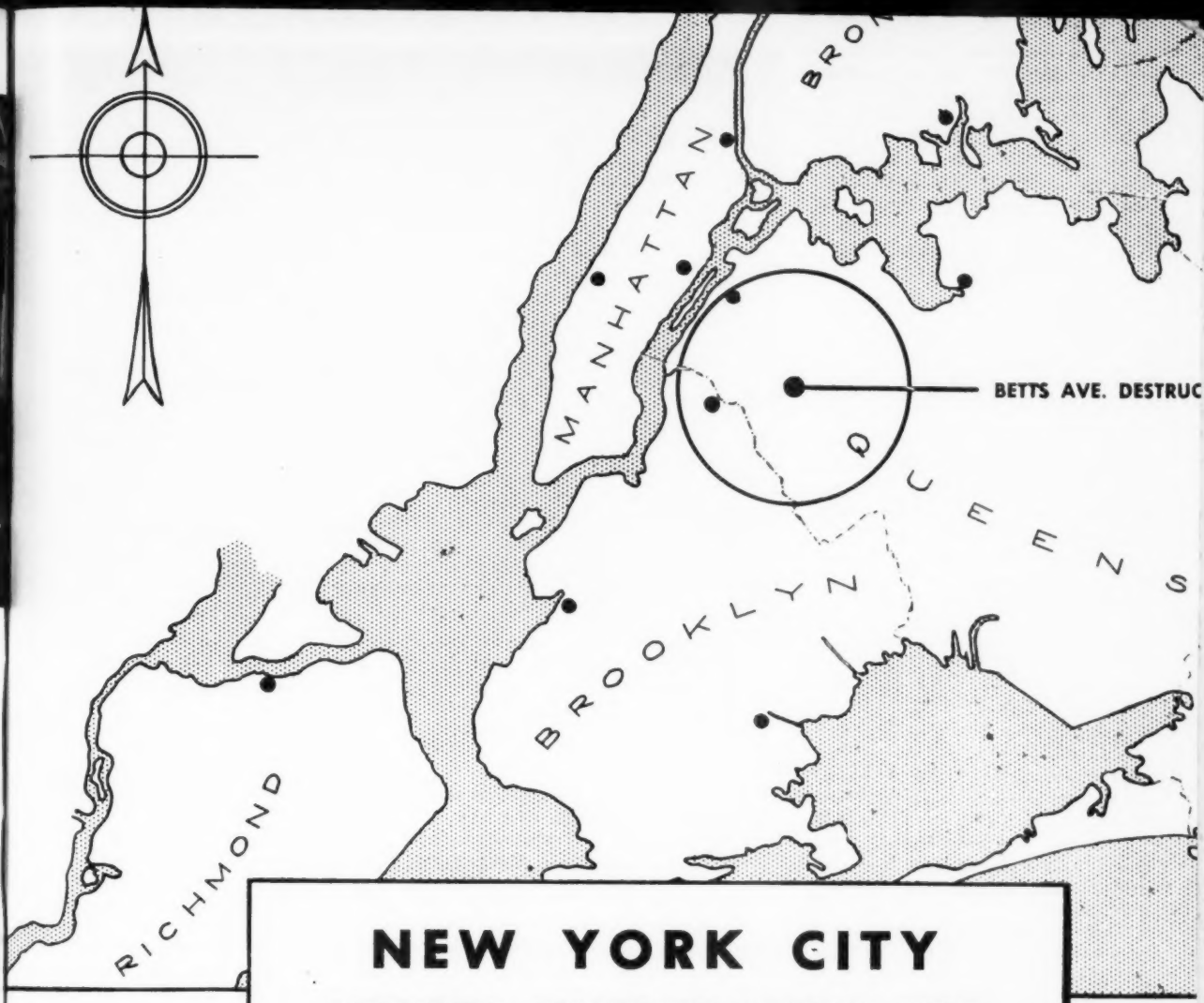


NEW YORK CITY
ADOPTS INCINERATION FOR REFUSE DISPOSAL

HENRY LIEBMAN

Director of Operations

Dept. of Sanitation, New York City

THE refuse-disposal policy of New York City has turned toward destruction by incineration and the use of landfill only for ashes, incinerator residue and non-combustibles. Previously, disposal by landfill was favored; construction of destructors was discontinued; some destructors were shut down and others were demolished; only about one-third of all refuse is now disposed of by incineration. This practice of disposal by landfill has used up all of the desirable dumping areas which were close to points of collection and required short truck hauls. At present, some hauls to existing fills are as long as fifteen miles each way. In addition, due to the large amount of garbage dumped close to built-up communities, very active opposition against disposal by landfill has developed, leading to court injunctions and unfavorable publicity. These sites would have been available for many years to come if they had been used only for incinerator residue, non-combustibles and ashes.

The Incinerator Program

In line with the new policy, the City proposes to build five new destructors of approximately 4,000 tons daily capacity, and to modernize and enlarge five existing destructors. The proposed new incinerators and their daily capacities are: Betts Avenue, Queens, 750 to 800 tons; Gansevoort St., Manhattan, 750 tons; West 9th St., Brooklyn, 750 tons; South Shore, just north of Jamaica Bay, Brooklyn, 750 to 1,000 tons; and in the Borough of Richmond, 500 tons.

In addition, five existing incinerators will be modernized and their

capacities increased: The 73rd St. and the 139th St. incinerators, both in Manhattan, increased from 300 to about 600 tons daily; Greenpoint, Hamilton Ave., and Flatlands Ave. incinerators, Brooklyn, increased from 500 to 750 tons daily; Ravenswood incinerator, Queens, will be demolished; the incinerator at West 215th St., Manhattan, and the Flushing incinerator, Queens, will be modernized.

When this program has been completed, which may take about five years, there should be enough incinerator capacity available to handle all of the combustible refuse produced in the city.

Modern Incinerator Design

The Betts Ave. destructor will be the first plant erected under the above program. It will have a capacity of 750 to 800 tons of refuse in 24 hours and will serve a population of 500,000 to 600,000, based on a refuse production of 2.7 pounds per capita per day. The new plant will be housed in a steel, concrete and brick building of modern architectural design, and will be attractively landscaped. The building will also house the necessary workshops, store rooms, offices, toilets, locker rooms, lunch rooms and other facilities.

This new destructor will be the most modern of its type and will probably set the pattern for all future designs for New York City. Among the technical features incorporated in the design will be provision for shredding of material; furnaces equipped with traveling grates for automatic feeding, drying and stoking; and residue quenching pits with drag conveyors for loading to trucks.

The design was prepared in the Department of Public Works, F. H. Zurmehlen, Commissioner, for the Department of Sanitation, W. J. Powell, Commissioner. Preparation of the plans and specifications were supervised by R. H. Gould, Director; W. Donaldson, Assistant to the Director; Henry Liebman, Bureau Chief; C. Rogus, Chief of Structural Section; George Iscol, Chief of the Mechanical Section; V. Greiff, Chief of the Electrical Section and A. Sigler, Architect. For the Department of Sanitation, J. C. Zengerle, Senior Mechanical Engineer, advised on the project.

Construction on this plant is now under way, and it is expected that it will be put into operation some time in 1950.

The area to be served by this destructor is primarily a residential

● ***THE NEW Betts Avenue refuse destructor, shown here in the artist's drawing, will have a capacity of 750 to 800 tons per day. This is the first new plant in New York City's extensive incinerator program, and will probably set the pattern for all future designs.***

one, though with a fairly large industrial section in Long Island City. Practically all of the refuse is collected by Department of Sanitation trucks. The relatively small amount of material collected by private cartment is mainly trade waste. The area produces considerable ashes, and it is intended to enforce a strict separation policy before the plant is put into operation.

Collection, Delivery and Storage

The Department has embarked upon a program of equipment replacement, standardizing on trucks with mechanical compacting loading devices. This replacement program was delayed by the war, and consequently equipment has been used far beyond its useful life. Records show that the average load collected by the old trucks was approximately 2 tons; it is expected that with the new trucks the average load will be in excess of 3 tons. On this basis, about 250 loads will be received at the plant daily.

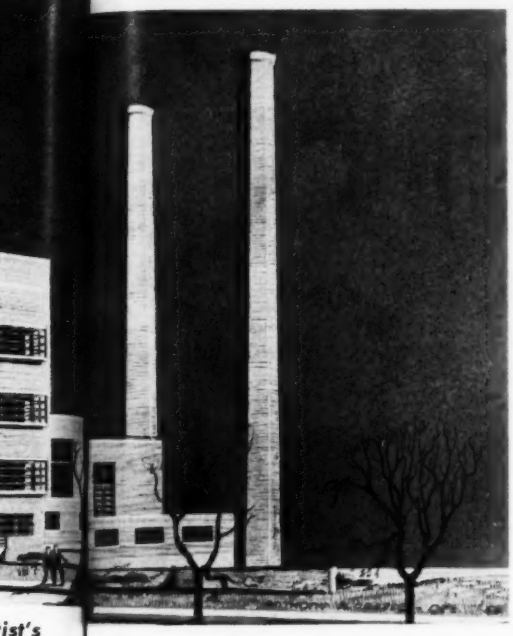
Records indicate that about 70% of the total daily truck loads are completed between nine in the morning and two in the afternoon. This will give a peak delivery at the plant of about 40 trucks per hour. Each load will be weighed at the entrance to the tipping floor on a 20-ton Fairbanks-Morse scale. As many as 70 loads per hour have been weighed on similar scales, and one unit will be sufficient. After the weight is recorded, the trucks will back up to the receiving pit for dumping. The elapsed time between entering and leaving the tipping floor is expected to average 5 minutes.

The receiving pit will be 164 ft. long and will accommodate at least 10 trucks, unloading simultaneously. The pit capacity will be 2,400 cubic yards, which will provide storage capacity for 16 hours of continuous operation.

Samples of refuse taken at existing plants vary in weight from 300 to 550 pounds per cubic yard. For design purposes, a weight of 400 pounds per cubic yard has been assumed.

Combustion of Refuse

The calorific value of the refuse will vary, of course, with the moisture content. In normal dry weather, the moisture content is about 70%. Available data indicate that the calorific value of either rubbish or garbage is between 7,500 and 8,000 btu per pound on a dry basis. A value of 7,750 btu has been assumed for design purposes. At 60°F, the calorific value of one pound of garbage as collected will be (0.3 x 7,750) — (0.7 x 1,120), or 1,540 btu.



It has been found in the operation of existing plants that a mixture of 65% garbage and 35% rubbish is satisfactory for combustion. On this basis, the average moisture content will be about 45½%, and the calorific value of the mixture will be (0.65 x 1,540) + (0.35 x 7,750) or 3,715 btu per pound.

The combustion air will be heated to approximately 300°F and about 6 pounds of air will be provided per pound of refuse burned. The heat in the combustion air will amount to 0.24 x 6 x 240, or 345 btu per pound of refuse burned. Each preheater will consist of 156 alloy steel tubes providing an effective heating area of 1,770 sq. ft.

The burning rate on the burning grates of each furnace will be 95 pounds per square foot per hour, based on a net grate area of 176 sq. ft. and a normal load of 200 tons per furnace per day. If the drying grate area is included as part of the total grate area, the burning rate will be 69.5 pounds per sq. ft. per day. Each furnace will be provided with two grates, which will be of the traveling stoker type, provided with variable speeds ranging from 10 to 150 feet per hour.

The four furnaces will have a capacity of 200 tons each per 24 hours. The volume of each furnace between the grates and the floor of the combustion chamber will be 1,800 cubic feet; the volume of the combustion chambers will be 6,570 cu. ft. The furnace and combustion chambers are designed to withstand a maximum temperature of 2,400°F, but temperatures in excess of 2,000° are not anticipated.

Shredding the Garbage

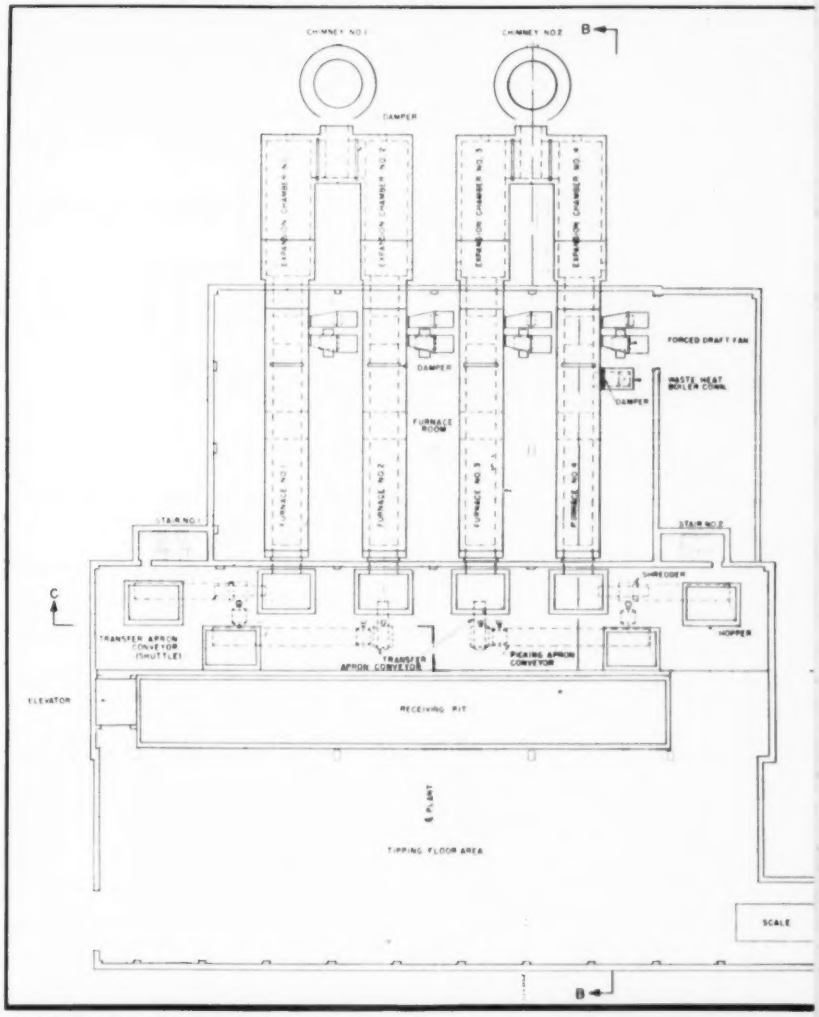
Four Jeffrey motor-driven shredders, each having a capacity of 30 tons per hour, are provided for reducing coarse or matted rubbish to a size suitable for burning on the mechanical stokers. These shredders are of the swing hammer type, driven by 150 hp motors. Two of the shredders will be belt-driven and two will be shaft-connected through couplings. Feed opening will be not less than 30 by 45 inches. In order not to transmit vibration to the building, the shredders will be set on coil spring isolators incorporated in the foundation. In addition, an impact factor of 100% was used in the design of the beams, girders and columns supporting the shredders.

Eight Jeffrey motor-driven steel apron conveyors are provided for conveying the garbage to and from the shredders. The feeding conveyors will be 4 ft. wide and have a speed of about 35 fpm; these will also serve as picking belts. The conveyors carrying the shredder refuse to the furnace charging hoppers will be 3 ft. wide.

Other Equipment

Aluminum grating is used for areaways, walkways and stair treads because of its durability, low maintenance and good appearance.

Two Harnischfeger 5-ton grab bucket traveling bridge cranes, with a span of nearly 45 ft., will handle the refuse from the storage pit into the furnace charging hoppers. Each of the Blaw-Knox buckets will have a capacity of 3 cu. yds. and the crane will handle about 5 yds. per cycle. Lifting speed will be 440 fpm; trolley speed 300 fpm; and bridge speed 250 fpm. The maximum lift



● ***MECHANICAL EQUIPMENT for the plant includes shredders, automatic feeding, drying and stoking grates, and drag conveyors for ash.***

will be 75 ft. and maximum trolley travel 40 ft. With rubbish and garbage having an average weight of 400 lbs. per cu. yd., each crane will handle about one ton per cycle of operation and will make 600 cycles per 24 hours. The furnace charging hoppers will have a capacity of 35 cu. yds., which will be sufficient for about 50 minutes of operation without recharging.

Each furnace will have a primary combustion air system consisting of a 33,000-cfm forced draft fan and connecting ducts between the fan, preheater and air boxes under the stoker. Each furnace will also have a secondary air system, consisting of a 3,500-cfm blower.

Ash pits consist of two inclined concrete troughs under each furnace to receive the residue from the discharge end of the burning grate. The pits will be filled with water. Ash will be removed by means of scraper conveyors which will discharge the ashes into trucks. Each of the conveyors will have a capacity of 60 tons per hour, based on a volume of residue 10% to 15% of the quantity of refuse burned.

Two oil burners are provided in each furnace for starting, and for maintaining the temperature when burning refuse that is wet or of low heat content. Each burner will have a capacity of 1 gpm of No. 6 oil. Two tanks of 5,000 gals. capacity each are provided for oil storage. Space heating will be of the low pressure type, and heat will be drawn from the furnaces when they are in operation. An auxiliary oil burner is provided for use when the furnaces are not burning.

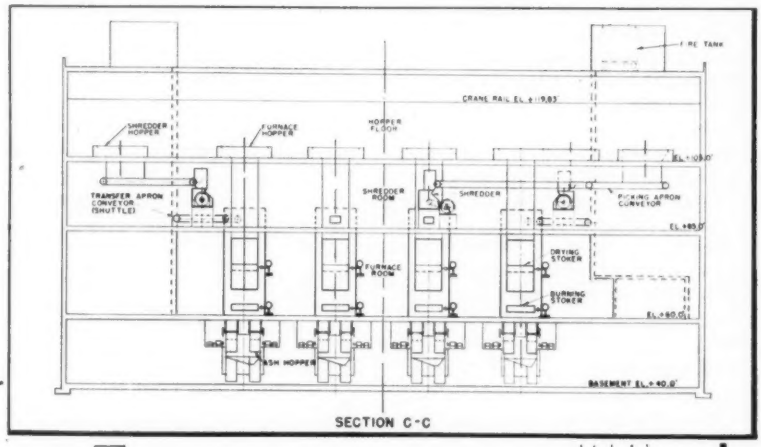
There are two chimneys, each 10 ft. inside diameter and 225 ft. high above the grates. The chimneys are higher than is necessary for draft requirements; the extra height was provided to insure absence of smoke nuisance. At the maximum load of 300 tons per furnace per 24 hours, and an anticipated stack temperature of 900°, the gas velocity in the stack will be about 40 fs. The outer brick shell is designed to withstand a wind pressure of 30 lbs. per sq. ft. Maximum stress in compression is 250 lbs. per sq. in., and in tension 25 lbs. Maximum soil pressure is 2 tons per sq. ft. The usual firebrick lining and steel corset are provided. Kellogg will supply the chimneys; firebrick are furnished by General Refractories; and insulation by Johns-Manville.

Design and Construction

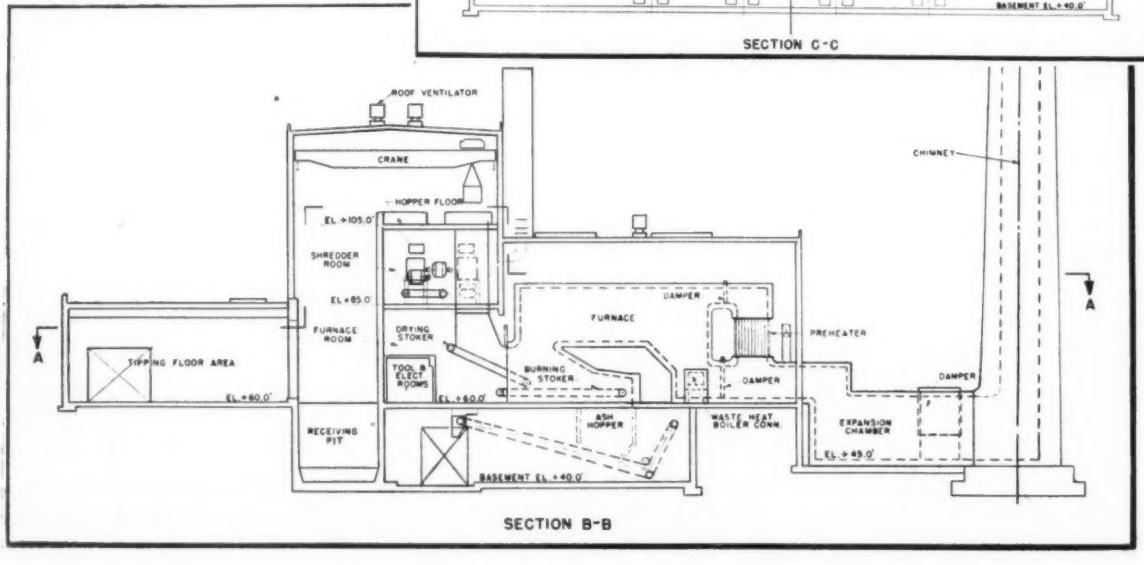
Live loading for design of roof-interior panels was assumed at 40 pounds per sq. ft.; for roof-exterior panels, 60 lbs.; for equipment maintenance stairs, landings and walkways, 70 lbs.; for other stairs, landings, passageways and walkways, 100 lbs.; and for trucking areas 175 lbs., or wheel concentrations from a 20-ton truck plus 18% impact. Special live loading was assumed as follows: Hopper floor, 100 lbs.; charging and shredding floor, 150 lbs.; storage room, 100 lbs.; main floor, furnace wing 150 lbs., tipping wing, 175 lbs.; and offices, toilets and corridors, 70 lbs. The basement loading was 100 lbs., the driveway 175 lbs. and the receiving pit 400 lbs.

Fusion welding was specified for all built-up members and for most of the connections. Resultant saving in weight approximates 20%. Allowable earth pressure for foundations was established at 3 tons per sq. ft., except for the chimney, which is 2 tons. Unit stresses for steel and concrete comply with New York City building code requirements.

The general contractor is Grove, Shepard, Wilson & Krug. Geo. Allen & Sons is contractor for furnaces, flues and equipment. Blowers are being furnished by American Blower Co.; compressors by Gardner Denver; instruments by Brown Instrument Co.; oil-burners by Todd; and chain grate stokers by McClave Co. The contract price for the plant was $4,039,345.



SECTION C-C



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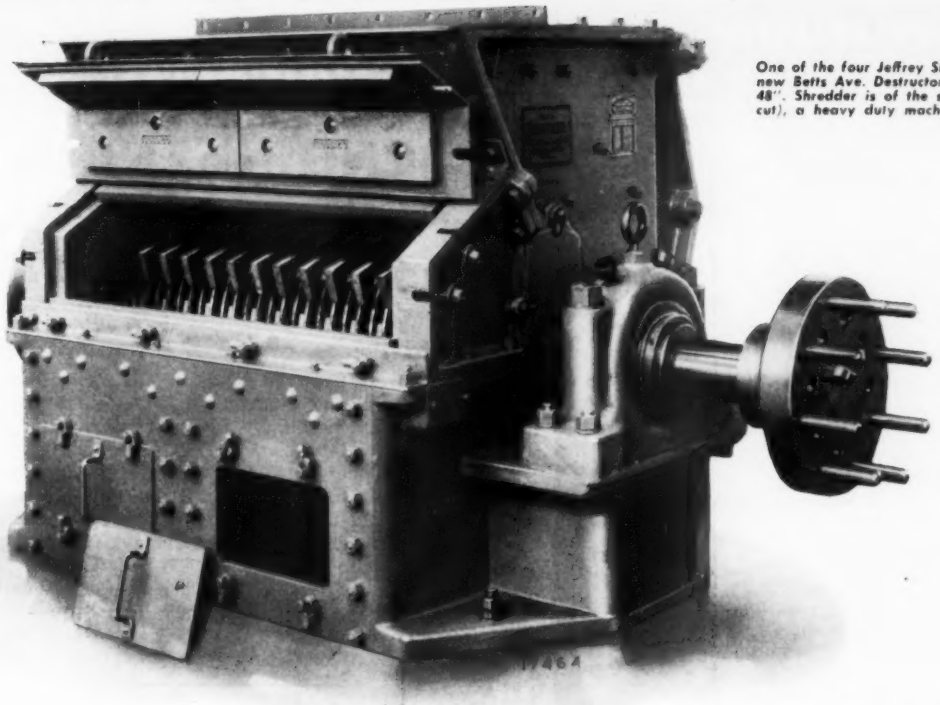

One of the four Jeffrey Shredders selected for the new Betts Ave. Destructor. Feed opening is 42" x 48". Shredder is of the swing hammer type (see cut), a heavy duty machine for large capacities.

JEFFREY SHREDDERS—STEEL APRON AND DRAG CONVEYORS SELECTED FOR NEW YORK CITY DESTRUCTORS

•

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To make the Betts Ave. Destructor the most modern of its type . . . to get the most efficiency in shredding and conveying, the design of this new plant includes: 4 Jeffrey Shredders; 8 Steel Apron Conveyors; and 8 Drag Conveyors. Here again "Jeffrey-Built" means Increased Capacity and Efficient Operation. Jeffrey engineers can help you in your modernization program . . . call upon them.

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Public Works ENGINEERING DATA

Bid Prices on Sewer Construction

Bids were received by St. Louis Park, Minn., on July 11 for the construction of sewers and appurtenances. Prices bid by Phelps-Drake Co., low bidders, were as follows: All VC pipe; 9", 0 to 8 ft. deep, $1.90 per ft.; 8 to 10 ft. deep, $2.25; 10 to 12 ft., $3.30; 12 to 14 ft. deep, $4.10; 14 to 16 ft. deep, $5.40. For 10-inch VC pipe, 12 to 14 ft. deep, $4.25 per ft.; 14 to 16 ft. deep, $5.50 per ft. For 12-inch VC pipe, 0 to 8 ft. deep, $2.20 per ft. For 4,360 ft. of house connections, $2.85 per ft. For manholes, 0 to 8 ft. deep, 22 at $160 each; and $16 per lineal foot of extra depth. Total of Phelps-Drake bid was $53,479. Next low bidder was $57,422.

Pipe Cleaning Increases Discharge 64%

In Glendale, Calif., an 8,000-ft. section of 33-year old cast iron water pipe was cleaned by the Los Nietos Pipe Cleaning Division of Flexible Sewer-Rod Equipment Co. Only 47 minutes were required for cleaning. Tests showed that the velocity of flow in the cleaned section increased from 3.5 feet per second before cleaning to 6.2 fs after cleaning; and that the discharge increased from 4.75 mgd to 8.80 mgd., an increase of 64%. Pipe diameter was 20 ins.

A 30-inch cast iron line 23-years old was also cleaned. This line was 11,000 feet long, and cleaning required only 58 minutes. Velocity before cleaning was 4.7 fs, and after cleaning 7.36 fs.

BHC Successfully Used for Fly Control

Aiken Co., S. C., is probably the first county to use benzene hexachloride for insect control. This county operates organized insect control crews which treat the fly-breeding areas in communities in the county. These crews consist of two men, with a jeep. Exteriors of homes, barns and other structures are sprayed using compression and fog-type sprayers. No data on the amount of BHC applied are given. It is expected that more than 6,000 homes will be treated this year. The work is under the direction of William S. Jones, senior sanitarian for the county. He states that in the areas sprayed, flies have been greatly reduced or wholly eliminated.

Bid Prices on Sewer Tunnel Construction

Bids were received on July 29 for constructing a portion of the Lower Delaware Low Level Intercepting Sewer, Philadelphia. Prices bid by the two low bidders were: Excavation in tunnel, 23,100 cy, $55 and $58; excavation in open cut, 1,820 cy, $15 and $3; 9.5 or 10-ft. concrete sewer in tunnel, 3,685 lf, $100 and $100; 9.5-ft. concrete sewer in open cut, 28 lf and 10-ft. concrete sewer in open cut, 42 lf, $100 and $100.

Wettable DDT Compound Easily Applied

In the application of DDT, especially in remote areas, it has been necessary either to transport a large volume of kerosene or other materials for the preparation of emulsions, or to use rather complicated sprayers with mechanical agitation. Pamisc, which has been developed by Pennsylvania Salt Mfg. Co., contains 75% DDT and can be applied with a simple hand or knapsack sprayer. This new form of DDT has been used with much success in Venezuela in malaria control. It has reduced transportation difficulties; in place of 200 tons of 5% DDT emulsion, it is now necessary to carry only 13 tons of solution to the point of use.

The method of application is reported as follows: An area of 20 to 25 sq. meters per minute are treated with 2 grams of DDT per sq. meter by means of Dobbins' No. 55 sprayer, using 5% Pamisc 50; or a Lofstrand spray pump, with 10% Pamisc 50. In both cases, the chemical is merely mixed with water at the point of application.

Vibration and Bond of Reinforcing Steel

When reinforcing steel extending into previously placed concrete is vibrated, as by a vibrator wedged between the bars, damage may occur to the partially set concrete. A study of this problem was made at the Engineering Experiment Station of Ohio State University, and the results were reported by Prof. J. R. Shank in the Experiment Station News. It was found that vibration up to 8 hours after the concrete had been placed improved the bond between the steel and the concrete. Between 8 and 24 hours, vibration was detrimental to the previously placed concrete-steel bond. After an age of 24 hours, no bad effects developed.

Photoelectrically Controlled Street Lights

In New Milford, Conn., photoelectric controls are used on 190 street lights, so that these turn themselves off and on, singly and automatically, whenever the prevailing natural light level at the lamp location, wanes to one foot-candle. The new street-lighting system extends over about 7 miles of roads and streets. In addition to providing illumination automatically when needed, an advantage of the system is that only one unit is affected by a failure and not the entire circuit. The installation is of General Electric equipment.

Reducing the Pigeon Nuisance

Devices employed by cities to reduce the nuisance around public buildings caused by non-migratory starlings and pigeons, include: using an electronic pigeon evictor that sends electric impulses every three seconds through three parallel wires laid in likely bird-resting places in Albany, New York; trapping pigeons, which proved ineffective in Los Angeles; feeding gin-spiked mash to dizzy the birds in Boston; and using fake owls, which proved unsuccessful in San Francisco. In Jacksonville, Florida, the city council has voted a $4,500 appropriation to have the pigeons trapped, executed, and fed to city prisoners.—*Public Management.*

Don't wait for winter!
BAUGHMAN Spreaders
give year-round service

BLIZZARD RAGES AS COUNCIL BUYS CINDER SPREADER

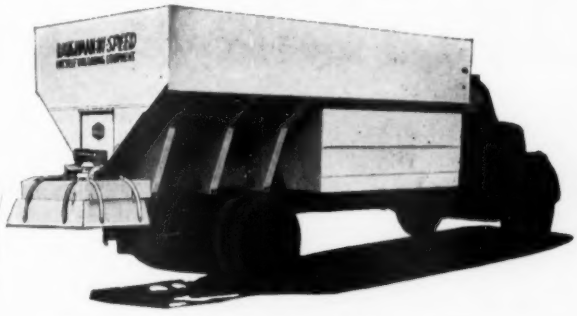
The City Council Wednesday night voted to buy a cinder and abrasive spreader from Baughman Equipment & Service Co., of Jerseyville at $1005.92.

Rising to propose closing of a contract for the cinder spreader, Alderman Wetstein, chairman of the streets repairs committee, glanced out of the window where snow was falling heavily in the first March blizzard.

"This resolution seems a bit late," he apologized; "We could be using a new spreader tonight."

A chief use of the new spreader will be to coat icy streets in winter storms to keep traffic moving. Being of automatic type, only one man, a driver, will be needed on the truck with which it will be equipped. In summer, the spreader will be used in connection with earth street maintenance work.

(Reprinted from Alton Evening Telegraph, Alton, Ill., Thurs., March 10, 1949)



When next winter's crippling storms strike, your summer purchase of a BAUGHMAN Spreader will prove to be one of the wisest investments you ever made. The BAUGHMAN will have been busy all summer long on road maintenance and dust control . . . stockpiling sand and gravel . . . spreading lime, fertilizer and seed in parks and airports.

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GOOD PRACTICE IN BACKFILLING TRENCHES

THE requirements of present State Highway Department standard specifications for the compaction of backfill in trenches, around and over culverts and for storm and sanitary sewers have been summarized by the Highway Research Board. The summary, which is presented herewith in a modified form, was reviewed by Harold Allen, Chairman, Department of Soils Investigation, and L. D. Hicks, Chairman of the Committee on Compaction of Subgrades and Embankments of the Highway Research Board. Reports were obtained from all 48 states and the District of Columbia.

Compaction requirements may be grouped as follows: A—those requiring compaction of backfill, but not specifying density requirements; and B—those controlling compaction of such backfill by specifying compaction to some minimum required density.

Requirements Not Specifying Density

All but eight of those replying specify that the soil shall be tamped or shall be thoroughly and/or carefully, firmly or solidly tamped, rammed or compacted. Nearly all specify the quality of compaction in the terms: ". . . to the satisfaction of the Engineer." Of these 41, eleven do not state whether compaction shall be by hand or mechanical methods, and give no requirements for hand tamping equipment. Five states mention hand tamping, but make no mention of mechanical tamping; two list no requirement for hand tamping; nine states specify mechanical tamping only. There is no uniformity in the requirements for tamping equipment; these vary in area of tamping face from 25 to 100 sq. ins., and in weight from 12 to 50 pounds. The 25-sq. inch area is most common.

All of the states in this group have some definite requirement for depth of lift. The depth of lift is either stated in terms of "loose thickness" or as a specific thickness of layer "before compaction" by 35 states. A loose depth of lift of 4 ins. is required by 3 states; a loose depth of 6 ins. is required by 29 states; depths of 8, 9 and 12 ins. loose thickness are required by the other 3 states.

In addition, one state provides a 4-in. depth for hand tamping and 6-ins. loose depth for mechanical tamping; another specified "not more than 8 ins. for mechanical and 4 ins. for hand tamping"; four additional states specified 6-inch depth of lift, but did not state whether this was loose or compacted depth.

The addition of water "if necessary to facilitate compaction" is required by 19 states. In regard to materials for backfill, 34 states require that "the material shall be approved or shall be selected material free from large lumps and/or clods, stones, rock, sod, roots, frozen lumps, etc." Granular materials are required by three states, and 5 others provide for "acceptable selected materials or, when specified, granular materials."

Saturation, flooding or puddling appears to be permitted by only 4 states; 2 may permit flooding of granular materials meeting certain grading requirements; 1 permits puddling around the pipe only; and one permits limited puddling in place of hand tamping.

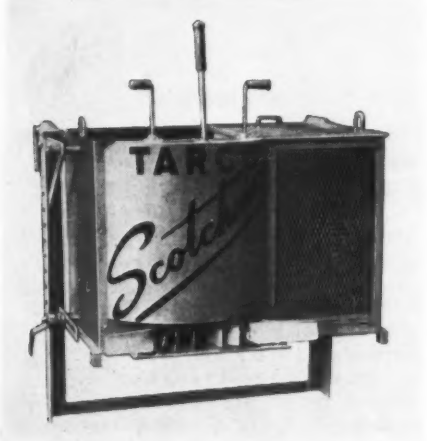
Requirements Which Specify Density Control

Compaction of backfill for trenches, etc., is controlled by 8 state highway departments by specifying minimum density requirements as follows: 3 require not less than 90% of the maximum density by AASHO T 99-38; one requires not less than 95% of the maximum by the same specification; 2 require not less than 90% relative density as determined by the California Method; 2 have minimum density requirements similar to those in AASHO M 57-42. Of the 8 departments which specify minimum density requirements, 4 make no reference to compaction methods or equipment; 2 specify mechanical tamping; and 2 specify mechanical or hand tampers having a tamping face not more than 25 sq. ins. in area.

Maximum thickness of lift during compaction is required by these departments as follows: 2, 6-in. compacted depth; 2, 6-inch loose depth; 2, not to exceed 4 ins. loose depth; 1, not to exceed 8 ins. loose depth; and 1 either 4 or 6 ins., depending on the method of construction.

All of these 8 state highway departments provide for control of moisture content during compaction. Granular backfill is required by 2 of the 8; granular backfill around the pipe and selected material for the rest of the trench are required by

CUTS ICE *and* SNOW REMOVAL COSTS



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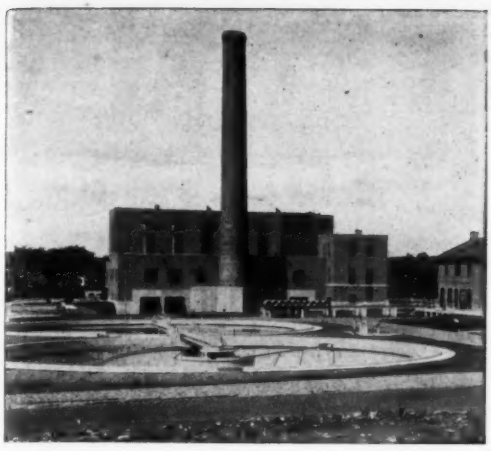
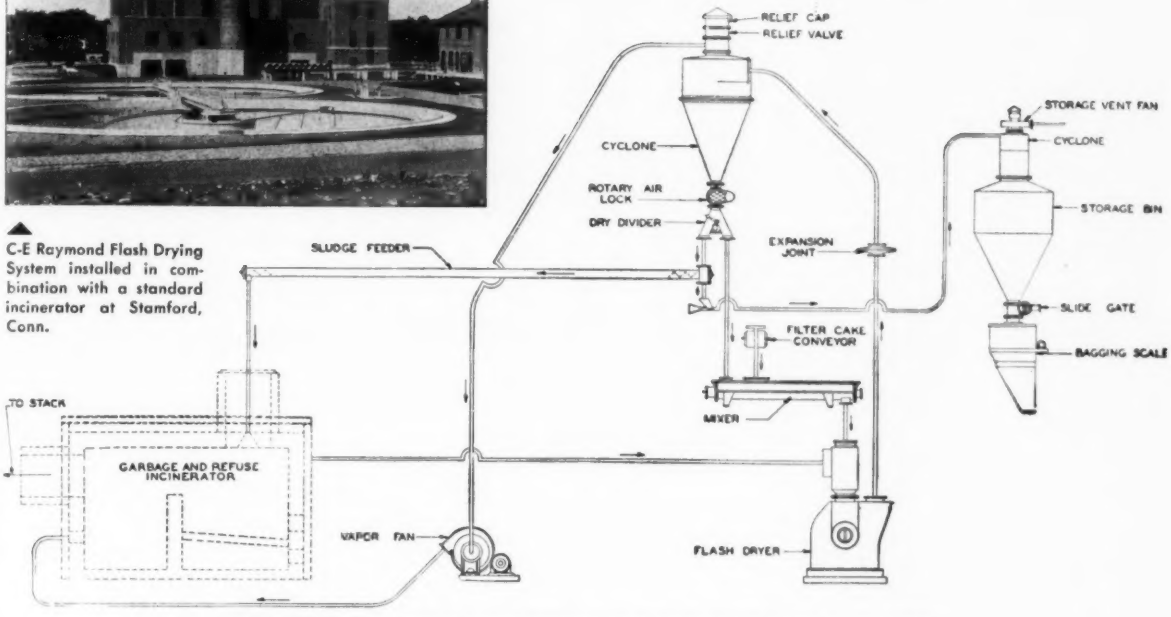


C-E Raymond Flash Drying System installed in combination with a standard incinerator at Stamford, Conn.

SIMPLIFY

the municipal waste disposal problem



FLOWSHEET SHOWING SLUDGE DRYING COMBINED WITH GARBAGE AND REFUSE INCINERATION

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A C-E Raymond Flash Drying System, installed in combination with a standard garbage and refuse incinerator, will dispose of *all* municipal wastes. Flash drying of sewage sludge is effected in the C-E Raymond System, while garbage and refuse are conventionally burned in the standard incinerator. Simple, clean and economical disposal . . . at one site.

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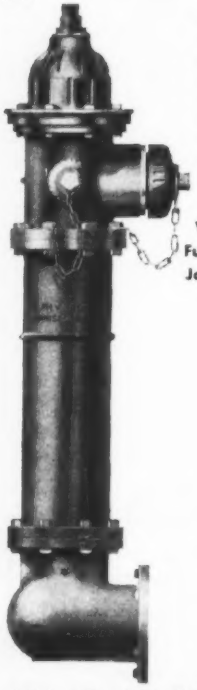

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one; the other 5 require selected or approved material "free from large or frozen lumps, rocks, roots and other extraneous material." Only one department permits puddling as an alternate to tamping, and material meeting specified grading requirements must be used.

Requirements for Backfilling Sewers

In the case of 12 states there are certain additional specific requirements for backfilling storm or sanitary sewer trenches. While the details differ slightly, it is general practice to require "suitable" or "selected" materials; to backfill around the pipe in 4-in. to 6-in. layers to about 1 ft. above the top of the pipe (one state "to the top"; 2 states to "4 ins. to 6 ins. above the pipe"; 4 states to 1 ft.; and 1 state to 2 ft.); and to fill the trench thereafter in 6-in. to 12-in. layers, either tamped or flooded. Most states prefer tamping; one permits jetting; none requires moisture control.

Colored Asphalt Development

Experiments carried out by the Road Research Laboratory, D.S.I.R., England, have produced, it is claimed, asphalt in colors such as cream, yellow, red, green and blue at a cost not very much greater than that of ordinary asphalt.

Colored asphalts made from pigmented "albino" bitumens have been used for many years, but they are much more costly than ordinary asphalt. Only dark shades can be produced because of the intrinsic darkness of the bitumen.

The new bright colors are made by using a proprietary brand of resinous binder known as "Cados." It is more translucent than albino bitumen and its cost compares favorably with that of ordinary bitumen. Using this binder and a clean white aggregate such as calcined flint it is possible, states the Laboratory, to obtain a fine white asphalt which can be easily colored with any desired pigment. The addition of 4 per cent of titanium oxide, for instance, gives a creamy white. Effective reds, and yellows, greens and blues have been made with as little as 2 per cent of other pigments.

The materials have not yet been tested under traffic, but a small area in four colors at the Laboratory is giving promising results. Trial areas on roads and footpaths are being planned, and the results of large-scale trials on public roads should be available in a few months time. —*Highways, Bridges* and *Aerodromes.*

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Don't confuse HANDEEZ with ordinary harsh abrasive-action hand cleaning compounds. HANDEEZ works differently—through a gentle emulsifier blended with a sterilized vegetable emollient. It lifts grime from the pores, leaving skin tissue unharmed and unbroken by tiny crevices which invite infection. Cutting oils and other deep-seated shop grime yield readily to the HANDEEZ formula which spells prompt, efficient cleansing with the added skin-safety factor.

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PUBLIC WORKS DIGESTS

Water Supply page 52

Highways and Airports page 58

Sewerage and Refuse page 66

● *This section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.*

THE WATER WORKS DIGEST

Ozonation of Philadelphia's Water

The world's largest ozonation plant is operating to reduce taste and odor in Philadelphia's water supply from the Schuylkill river. The process consists of six steps: (1) Filtering air through an electronic precipitation filter; (2) blowing by positive displacement blowers through (3) refrigerative dryers to lower the temperature to 50°, and (4 completing the demoisturing by adsorptive dryers. (5) Fifty generators with a capacity of 1250 lb. per day are designed to produce ozone at the rate of 0.5 to 1.0 per cent of the weight of dry air blown through them. Conversion of oxygen to ozone takes place as the air flows through continuous electric coronas in the generators. Coronas are formed in cylindrical annular openings in a boiler-like shell with 85 graphite-lined tubular glass electrodes within stainless steel tubes, a 15,000-v. alternating current being impressed on this circuit. (6) Ozonated air is bubbled upward through 18½ ft. of water in a three-section contact tank through which the water flows continuously as ozone is diffused through porous-plates on the bottom.

Ozone dosage averages 1.6 ppm. but a maximum of 4.0 ppm. may be added.

Elbert J. Taylor and Elwood L. Bean—"Ozone in Quantity: How It Is Produced;" *Engineering News-Record*, July 28.

Cyanosis And Well Water

Cyanosis in infants appears quite definitely to be due to nitrates in farm well water. Studies by the Iowa State Hygienic Laboratory found 69 cases of infant cyanosis associated with NO_3N in rural water supplies. There appears to be close correlation between the NO_3N content of rural water supplies and their coliform content. The nitrate content of these wells changed rapidly; in one case from 70 ppm to 10 ppm in two weeks. No wells over 200 ft. deep were found to contain more than 10 ppm of NO_3N, which amount is thought to be less than that needed to cause cyanosis.

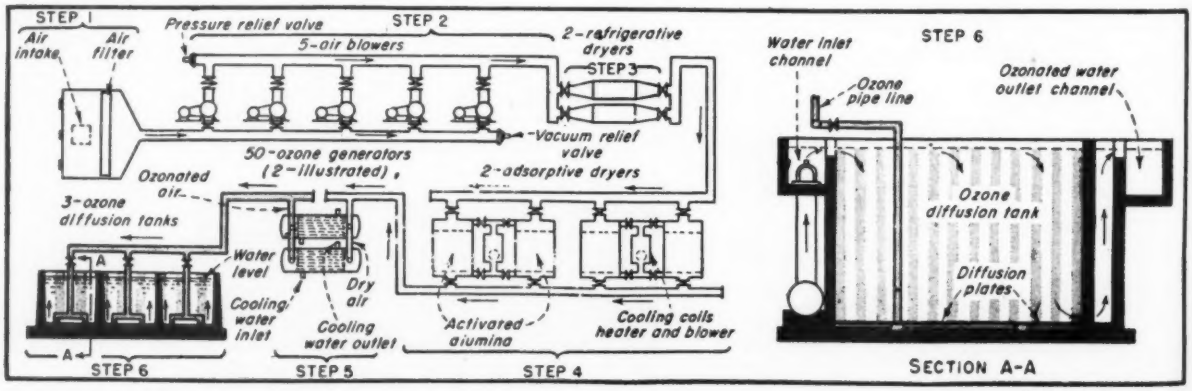
I. H. Borts—"Water-Borne Diseases;" *Am. Jour. of Public Health*, August.

Applying for Increase in Rates

The author believes that three premises may be assumed to be correct:

1. When the water service being rendered is satisfactory, the public does not object to increases in rates sufficient in amount to cover the entire cost of service.

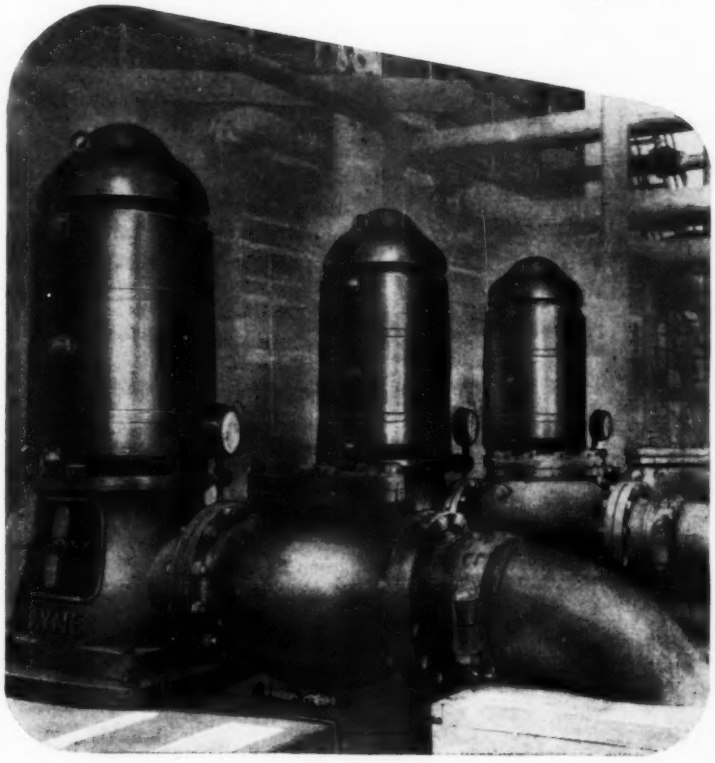
2. If the water service is unsatisfactory, the public will object to increases in rates even though the proposed increase is only enough to cover increases in costs.



Courtesy Engineering News-Record

● *THE SIX STEPS in the ozonation of Philadelphia's water supply.*

What About Checking On Operation Cost



High Efficiency Brings Big Saving

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3. Rate increases, proposed in connection with acceptable plans to correct faults and deficiencies of plant and service will not be subject to objection.

In brief, the public has more interest in service than in rates.

John H. Murdoch, Jr.—"The Public and Rate Increases"; *American Water Works Ass'n Journal*, July.

"It is indisputable that as a matter of law a municipal utility is entitled, the same as a private utility, to reasonable return upon all of its property used and useful in the public service." "The New York Commission has been a leader in insisting that rate adjustments must be supported not merely by showing that increased revenue is required but also by proof that the rates proposed distribute such required revenue equitably among all classes of customers in reasonable relation to their respective costs of service." "Much more complete information than is now available regarding the demand, consumption, load factors and diversities of different classes and sizes of water consumers would be invaluable to the industry and to the Public Service Commision for cost analysis and rate design purposes on metered systems."

Apportionment to cost of fire protection service might be based on the ratios of noncoincident or coincident maximum demands, separate or incremental plant costs, average demands per unit of area, or other considerations. Depending on which of these is used, estimates for the same system can run all the way from 10 to 50% of the fixed costs of readiness to serve.

Maurice R. Scharff—"Rate Revision in the Light of Present Costs"; *American Water Works Ass'n Journal*, July.

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There's good reason for their confidence, because Lincoln, Nebraska is protected by Mathews Modernized Hydrants—and that means safety *plus*.
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Geology in Ground Water Prospecting

The purpose of geology in the search for ground water supplies is: (1) to delimit the unproductive regions and concentrate the investigation in those areas where the possibilities of a satisfactory supply are good; (2) to identify the water-bearing beds or ascertain their presence or absence in order to avoid the drilling of unnecessary footage in test holes and wells; and (3) to determine, by geologic interpolation and extrapolation, the nature of the material between the holes drilled and extend the information beyond the actual testing area.

O. S. Fent—"Use of Geologic Methods in Ground Water Prospecting"; *American Water Works Ass'n Journal*, July.

Rapid Filtration at Chicago's South District Plant

The most important of the interesting features of the Chicago South District filtration plant is the high-rate operation of the filters. This was made possible by the development, in 1937, of means of toughening the coagulation by use of acid-treated sodium silicate. In the new plant, 10 of the 80 filters are being operated at rates of 4-5 gpm per sq. ft. With a 5 gpm rate, the friction loss through the sand was 1.83 ft. as compared to 0.67 ft. at a 2 gpm rate. The "time in service" at this rate averaged 95%, and at a 4 gpm rate the average time was 97.2%. The lengths of filter run averaged 8.1 hr. at 5 gpm and 15.4 hr. at 4 gpm, chiefly due to the fact that the available head on the filters was limited, by the construction of the plant, to 7.7 ft. As to efficiency of filtration, the only standard applied was turbidity of the effluent; the bacteria are killed by chlorination before the water is filtered.

Acid-treated sodium silicate is

such a powerful coagulant-strengthening agent that raw water of almost any quality may be coagulated and filtered through sand of 0.65-0.90 mm effective size at high rates without danger of coagulated material passing the filters. The strongest coagulation is produced when the sodium silicate added (as SiO_2) is about 40% of the aluminum sulfate. Generally the cost of the silicate and acid is equalled by the reduction in the amount of coagulant required, though this will not be true for all waters. By far the most sensitive testing device for coagulated material passing the filters is the cotton plug filter, which retains every particle of such material.

John R. Baylis—"Chicago South District Filtration Plant"; *American Water Works Ass'n Journal*, July.

Minimizing Service Interruptions

Five basic considerations should always be kept in mind in the operation and maintenance of any water system in order to minimize the period of interruptions from breaks in large lines:

1. Duplication of piping at the plants and of large mains, should be provided wherever possible.

2. There should be sufficient interconnections between mains and sufficient valves to segregate the lines.

3. Valves should be maintained in good condition, so that they may be located and operated without delay.

4. A system of accurate and easily understood records should be established, with copies available for field men.

5. Provision should be made for good communication systems and definite arrangements for emergency response at all times.

Harvey T. Munn—Discussion of "Minimizing Service Interruptions Due to Transmission Line Failures"; *American Water Works Ass'n Journal*, July.

Runoff for Ground Water Recharge

Because the runoff from a third of the Requannock water shed of Newark, N. J., is not controlled, a considerable part of it runs to waste over the dam. This surplus has been used for recharging the private wells of a Newark brewery which used large quantities of water, being brought 25 miles through existing piping, then through 3" and 4" metered connections to five wells of the company. From March 15 to June 17, 1948, a total of 128 mg was delivered to the wells. On March 15 the standing water level of the wells was about 130 ft. below ground surface, but by April 2 had risen 60 ft. The service was then interrupted for 11 days and the level dropped 20 ft. The experiment was concluded June 17. On October 1, the water level was approximately 30 ft. higher than it had been a year previous. It would appear profitable to the city to sell the overflow water as it occurs, even at a special low price for recharge water, rather than receive no income from it.

Edwin T. Erickson—"Using Runoff for Ground Water Recharge"; *American Water Works Ass'n Journal*, July.

Activated Silica Sols

In treating the water of the Miami Canal, Florida, it was found that no amount of alum up to 137 ppm will give a satisfactory floc, but a relatively small amount of activated

CUT RUST REMOVAL COSTS

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silica will give satisfactory, though not excellent, results. The use and preparation of silica sols were studied at Miami and it appeared that the stability of a silica sol is dependent upon its concentration and upon the degree to which it has been neutralized. The weaker concentrations require not only complete conversion of Na_2O to $NaHCO_3$, but some free carbon dioxide as well, for complete and immediate gelation. Stronger sols will gel in a very short time when activated only beyond the Na_2CO_3 (50% neutralization) stage or sooner. The less completely neutralized sols, which become solid gradually, may still be used while in the semiliquid stage.

A concentration of 1.5% SiO_2 was selected as giving the best working stability while permitting a small storage tank space for the prepared sols. The 2.0% concentration may be used where control of all operations is assured, but 3.0% is not recommended. The 1.5% SiO_2 sols may be neutralized with carbon dioxide to the point of 65% conversion to the bicarbonate, and will then be stable for well over a week. The sol should be more than 50% neutralized for immediate use.

Clarence R. Henry—"Characteristics of Activated Silica Sols;" *Am. Water Works Ass'n Journal*, June.

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The Ford Copperhorn for vertical lines provides TWO important savings . . . . first in original settings and then, later, whenever changes or replacements are necessary.

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Water Consumption In Canadian Cities

From a questionnaire relative to increased consumption in Canadian cities during the period 1938-1948, the author received 79 replies. Four cities had decreased consumption, three by repairing leaks and one because of reduced industrial activity. The other 75 reported increased consumption. The two chief causes were increased populations and increased industrial use. Underground leakage has increased in a number of cities where snow is completely removed from the roadways. (Ottawa, because of this, in 1948 had 55 broken mains 5" or larger, three times the average of the previous nine years.)

In communities where all services are metered, the per capita consumption is being kept at a reasonably low figure. But where individual services are not metered the consumption is so much higher that, if 100% metering were in effect, a 30% greater population could be supplied without enlarging pumping or purification capacity.

H. R. Hooper—"Increased Water Consumption in Canada;" *Am. Water Works Ass'n Journal*, June.

Sporicidal Properties Of Chlorine Dioxide

Spore-forming organisms are a source of annoyance by providing inoculation for after-growths in distribution systems. Studies were made to learn whether chlorine dioxide could be used more successfully than chlorine for eliminating this annoyance. The studies indicated that it could, if compared with chorine on equal OTA residual basis. Under conditions where ammonia content of the water requires breakpoint application of chlorine for control of spores, chlorine dioxide may offer a decidedly superior method of treatment. Less weight is needed than of chlorine.

G. M. Ridenour, R. S. Ingols and E. H. Armbruster—"Sporicidal Properties of Chlorine Dioxide;" *Water & Sewage Works*, August.

Killing Weeds In Reservoirs

No chemical is offered for killing weed growths in the water itself. For those growing on banks immediately adjacent to the water, chemicals must be of such character that they will not prevent the use of water for drinking or culinary purposes. The 2,4-D weed killers are particularly effective against broadleaf plants, killing the tops, and the roots also of a large percentage.

They are non-poisonous to humans and animals, and neither combustible nor inflammable. Chlorates are said to be the most effective, but involve fire hazard. Borax compounds kill most plants, are easily applied, non-cumbustible, non-corrosive and safe to handle, kill all vegetation.

Martin E. Flentje — "Chemical Weed Killers"; *Water & Sewage Works*, August.

BIBLIOGRAPHY

American Journal of Public Health

Water-borne Diseases. By *I. H. Borts*, Director, Iowa State Hygienic Laboratory. August, Pp. 974-978.

American Water Works Ass'n Journal

The Fluoridation of Public Water Supplies. Policy and Procedure Recommended by Bd. of Directors. July, Pp. 575-579.

The Public and Rate Increases. By *John H. Murdoch, Jr.*, V. P., W. W. Service Co. July, Pp. 580-584.

Rate Revision in the Light of Present Costs. By *Maurice R. Scharff*, Cons. Engr. July, Pp. 585-589.

Use of Geologic Methods in Ground Water Prospecting. By *O. S. Fent*, Cons. Geologist. July, Pp. 590-598.

Chicago South District Filtration Plant. By *John R. Baylis*, Engr. of Water Purif. July, Pp. 599-615.

Design and Operational Problems of Small Water Plants. By *Ivan M. Glace* and *Martin E. Flentje*, Cons. Engr. and Research Engr. July, Pp. 616-626.

Minimizing Service Interruptions Due to Transmission Line Failures. By *Wm. W. Brush*, Ed. W. W. Engineering. July, Pp. 627-640.

Use of Models in Solving Flocculation Problems. By *S. L. Tolman*, Jeffrey Mfg. Co. July, Pp. 641-646.

Using Runoff for Ground Water Recharge. By *Edwin T. Erickson*, Asst. Engr., Div. of Water, Newark, N. J. July, Pp. 647-649.

Watershed Sanitation and Industrial Use. By *Carl A. Heckmer*. July, Pp. 650-652.

Cement as a Jointing Material. Panel Discussion. July, Pp. 653-660.

Construction and Traffic Safety Measures. Compiled from California sources. July, Pp. 661-674.

Contractors Record (England)

Water Samples. By *A. H. Waddington*. July 13, Pp. 11-15.

Engineering News-Record

Ozone in Quantity: How It Is Produced. By *Elbert J. Taylor*, Chf. and *Elwood L. Bean*, Prin. Asst. Engr., Bureau of Water, Philadelphia. July 28, Pp. 32-36.

Tacoma Finds Water-Line Surge Possible Earthquake-Damage Source. July 28, P. 36.

Getting Ready to Drive a Deep-Water Tunnel. Aug. 4, Pp. 32-35.

Drinking Water from Sea Water. Aug. 11, Pp. 30-31.

Maine Water Utilities Ass'n Journal

Pumping Equipment for Water Utilities. By *C. R. Westaway*, Ingersoll-Rand Co. July, Pp. 65-81.

New England Water Works Ass'n Journal

Modern Diesel Practice for Waterworks Plants. By *David L. Gallagher*, Worthington Pump & Machinery Corp. June, Pp. 105-116.

Diesel Pumping Unit for Manchester Water Works. By *Clarence L. Ahlgren*, Asst. W. W. Engr., Manchester, N. H. June, Pp. 117-127.

Introduction of Prechlorination of Slow Sand Filters. By *Samuel Jacobson*, Chemist, and *Marshall S. Wellington*, San. Engr., New Haven, Conn., Water Co. June, Pp. 128-149.

One Hundred Years of Public Water Supply for Boston. By *James J. Matera*, Supt. Wachusett Sect. June, Pp. 150-164.

Algae Control at Danbury, Conn. By *Ellis A. Tarlton*, City Chemist. June, Pp. 165-174.

Public Works

Portable Pump Furnishes Water for Soil Compaction. August, P. 23.

Design Factors for a Clearwell. By *Albert M. Eldridge*, Design Engr., Austin, Tex. August, Pp. 29-30.

Emergency Equipment at Chicago's South District Filtration Plant. August, P. 30.

Why Increase Water Rates. By *R. H. Harmeson*, August, Pp. 34, 36.

Water Works Engineering

Remodeling a West Australian Supply System. By *H. Bowden Fletcher*. July, Pp. 618-620.

Flow Summation System at Chicago Filtration Plant. By *Charles G. Richardson*, V. P. Builders-Providence. July, Pp. 625-626.

Safety for the Distribution System Forces. By *Angus D. Henderson*, Dept. of Water Supply, New York City. July, Pp. 630, 665.

Technique de l'Eau (Belgium)

Caracteristiques et Culture des Bacteries Reductrices des Sulfates. Par le Laboratoire Reignier, Bruxelles. July, Pp. 5-10.

Water & Sewage Works

Sporicidal Properties of Chlorine Dioxide. By *G. M. Ridenour, R. S. Ingols* and *E. H. Armbruster*, Assoc. Prof., Assoc. Research Prof. and Research Assoc., Georgia Inst. of Tech. August, Pp. 279-283.

Chemical Weed Killers. By *Martin E. Flentje*, Engr., Am. W. W. Co. August, Pp. 305-306.

Operation of Small Water Plants. By *A. E. Clark*, Gen. Mgr., Nashville Suburban Utility Dist. August, Pp. 307-308.

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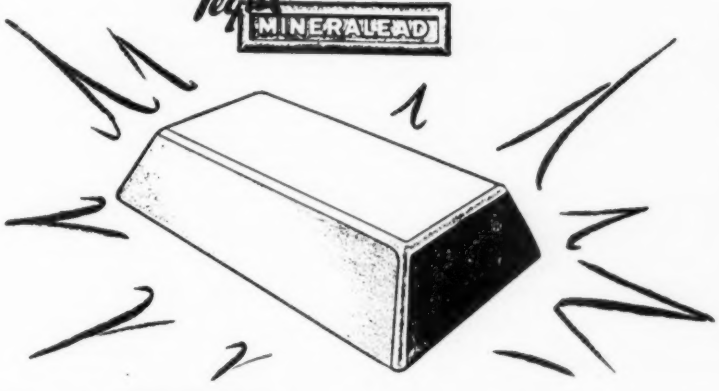

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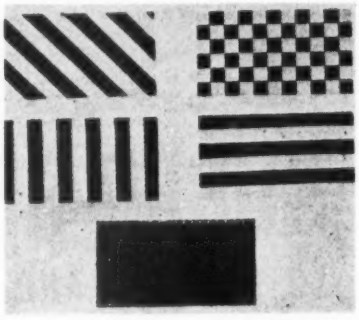
Widening North Carolina Pavements

Road pavements built in North Carolina, as elsewhere, in the 1920s were too narrow for present traffic conditions, being 16 ft. to 20 ft. wide, and are being widened by extending each side of pavements 2 or 3 ft. The added area is made of a flexible base covered with a bituminous type surface. The bases are built with sand-clay, sand-clay gravel, gravel, crushed stone, sand asphalt or soil cement, placed in a trench 8" deep and 2 ft. or 3 ft. wide. The trench is dug by means of a special bucket with a lip having the exact dimensions of the excavation, operated by a front-end loader, which is preceded by a grader with a tooth scarifier. When both base and bituminous surface are placed as a single project, the base is compacted in two or three layers; but a large amount of the widening was done in progressive stages, when the base material was placed as a single layer, rolled with trucks and a motor grader, and given a bituminous surface treatment; and later, when conditions warrant and funds permit, both widened area and the old surface are covered with a retread or a plant-mixed bituminous surface.

B. W. Davis—"How Narrow Pavements Are Widened"; *PUBLIC WORKS, August.*

Marking Pedestrian Crossings

The (British) Road Research Laboratory for two years past has been investigating the conspicuity of various types of road surface markings for pedestrian crossings. For this purpose it used a model on a scale of 1:24, under conditions simulating wet and dry road, by day and by night. The model roadway was a sheet asphalt surface 24 ft. long and 12" wide, with a slot midway of the length for inserting different crossings flush with the pavement. The height of the eye was set 2½" above the surface. The different patterns of crossing strips were painted on plywood strips which fitted into the slot in the pavement. The patterns used were longitudinal, transverse and diagonal stripes 2 ft wide; also 1 ft. and 3 ft. longitudinal stripes, and a checkerboard of 2-ft. squares; also white solid, and a row of steel studs on each side. The colors used were white, black, red, yellow and green. A number of observers were used and were practically unanimous in their opinions that the most conspicuous color combinations were black and white, with red and white nearly as good. The most conspicuous pattern was 2 ft. stripes parallel to the curb. A rough surface was best, especially when wet. At night all markings were less conspicuous, but a light directly over the crossing improved this greatly. A 2" or 3" camber of the crossing made it more conspicuous to drivers. Steel studs were less conspicuous than any of the patterns. Experiments with actual road crossings are now being conducted in a number of cities. Apparently they increase the observance of the crossings by both pedestrians and motorists.



Courtesy The Surveyor

● ***PAVEMENT markings tested.***

"Experiments in the Marking of Pedestrian Crossings"; *The Surveyor*, July 8.

Methods and Instruments For Testing Nonrigid Pavements

A cooperative investigation has been conducted by the Bureau of Public Roads and the Asphalt Institute to develop the load-supporting values of nonrigid pavements by full-scale field tests and correlation of these data with laboratory tests and with in-place determination of various values of the base-course and subgrade components. This has included the devising of innovations in plate-load testing techniques and equipment. Load areas of 1 to 7 ft. diameter were used, concrete disks for those 42" and larger. A rapid method of testing has been developed which permits conducting a number of tests in a relatively short period of time, giving complete load-deflection relations and also information pertaining to the behavior of components of a flexible pavement structure.

R. J. Lancaster and J. E. Driscoll —"A Cooperative Study of Structural Design of Nonrigid Pavements"; *Public Roads*, August.

Compacting Micaceous Soils

Improving Atlanta's airport involved 2,000,000 cu. yd. of excavation. The soil consists largely of micaceous clay ranging in moisture content from 18% to 25%, with some red plastic clay. Obtaining the maximum density requires reducing the moisture to 15%. The excavated soil is placed in windrows, care being taken to so distribute the dumped loads as to permit blending the soils to eliminate heavy mica concentrations. The windrows are spread with a bulldozer and compacted with sheepsfoot rollers calculated to give ground pressures of 475 psi, making 8 to 10 passes on each lift. Compaction to more than 80 to 85% density is difficult, owing to the elasticity of the micaceous soil, which lacks both cohesion and internal friction, and superimposed layers have no firm foundation against which to be compacted.

"Micaceous Soil Chief Problem at Atlanta Airport"; *Roads & Streets*, July.

Widening Bridges and Culverts

Story Co., Iowa, has developed a practice of widening its narrow concrete bridges and culverts with

creosote timber extensions; and replacing untreated wood spans and light trusses with all-creosoted material for substructures and floors, using steel I-beam stringers for spans of more than 20 ft. The I-beam stringers are placed on 2-ft. centers, and carry a 4" x 12" creosoted floor. Extensions are built with 2 ft. greater span and 1 ft. higher than the old structure, and generally are upstream from it. Box culverts of 6 ft. span and less are extended by inserting round corrugated culvert pipe 18" into the end and filling the space between old box and pipe with concrete. Where the box culvert is not square and less than 5 ft. high, flat-arch corrugated pipes are used instead of round ones. In 1947 an I-beam bridge of two 35 ft. and two 40-ft. spans, with a 20-ft. roadway, a 4" creosoted floor with clay-gravel wearing surface, hand rails and 3 ice-breakers was built for $10,288.79.

Sam Steigerwalt — "Economical Local Bridge Program"; *Better Roads*, July.

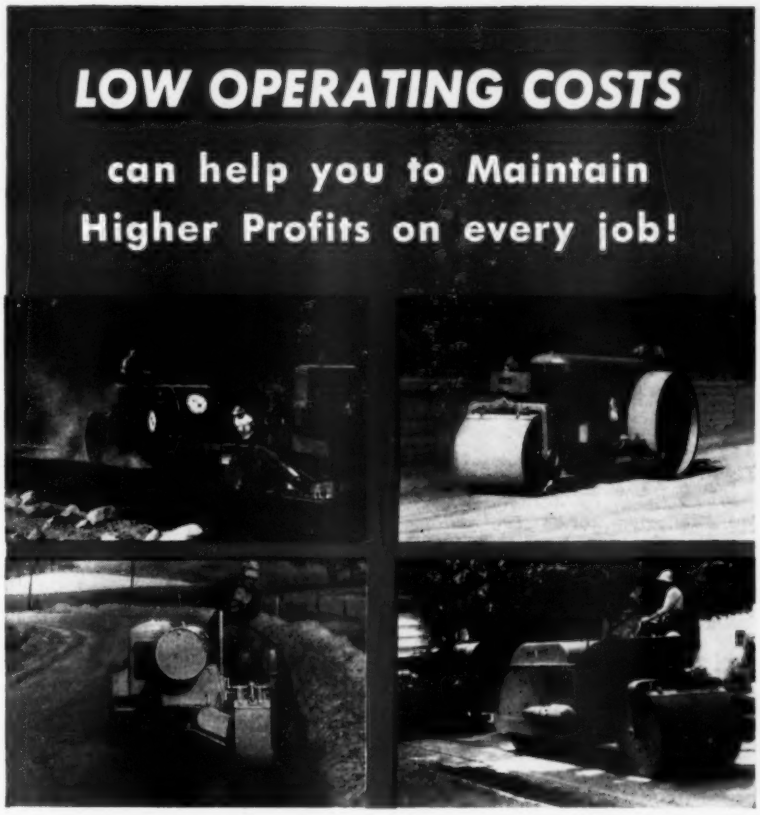
Possibilities Of New Herbicides

Since the advent of the 2,4-D, some new chemical herbicides have been found, such as the 2,4,5T. There has also been development in equipment for applying herbicides along highways, including low-pressure sprayers, with controls and nozzles suitable for this particular work. A high-volume low-concentration appears to be most economical and efficient for normal conditions; but weeds growing in rough areas inaccessible to heavy vehicles can be killed effectively by low-volume high-concentration sprays applied by a light truck or even knapsack sprayers. Several engineers report that brush is controlled more effectively by cutting it down first and spraying the shoots when they have grown 12" to 18" high.

H. A. Radzikowski—"Great Possibilities Seen in New Herbicides"; *Better Roads*, July.

Counties Join To Employ Engineer

The employment of a county engineer jointly by two or more counties in North Dakota has worked out very satisfactorily. The two counties hire an engineer on an hourly basis, guaranteeing him a minimum salary. In some cases he can do outside private engineering. His assistants also are hired on an hourly basis. His equipment is supplied jointly by the two counties.



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This plan is recommended by the highway department only for small counties whose financial status would make it a hardship for each to employ an engineer.

O. L. Hagen—"Counties Join to Employ Engineer"; *Roads and Streets*, July.

BIBLIOGRAPHY

American City

How Rome, N. Y., Handles Snow Removal. By *Ira Elmer*, Com'r of Public Works. August, Pp. 97-98.
Electric Panels Clean Snow in Detroit Tests, August, P. 117.

Better Roads

Economical Local Bridge Program. By Sam *Steigerwalt, Co.* Engr., Story Co., Ia. July, Pp. 23-25, 40.
New Plant for Minnesota County. July, Pp. 27, 28, 33.
Great Possibilities Seen in New Herbicides. By *H. A. Radzikowski*, B.P.R. July, Pp. 35-36.

Contractors Record (England)

Concrete Road Jointing Materials. By R. *S. Millard* and *P. L. Critchell*, Road Research Laboratory. Aug. 3, Pp. 11-16.

Engineering News-Record

Making Sand Drains Stick in the Mud July 21, Pp. 42-43.

Public Roads

A Cooperative Study of Structural Design of Nonrigid Pavements. By *R. J. Lancaster*, Research Engr., B.P.R., and *J. E. Driscoll*, Asphalt Institute, August, Pp. 185-188, 200.
Life Characteristics of Highway Surfaces. By *Fred B. Farrell* and *Henry R. Paterick*, B.P.R. August, Pp. 189-196.
Selection of Reference Densities for Bituminous Pavement Specifications, By *H. M. Rex*, B.P.R. August, Pp. 197-200.

Public Works

How Narrow Pavements Are Widened. By *B. W. Davis*, State Maint. Eng., No. Carolina. August, Pp. 20-22.
Road Relocation Cuts Curves 90%. By *L. R. Redden*, Distr. Office Engr., Calif. Div. of H'ways. August, Pp. 27-28.
Using Plastic for Highway Signs and Markers. August, Pp. 46-47.
Saving Money With Better Maintenance Equipment. August, P. 44.

Roads and Streets

Micaceous Soil Chief Problem at Atlanta Airport. July, Pp. 43-46.
Sand Wells Installed as Slide Preventive on Virginia Road Location, July, Pp. 50-51.
Subaqueous Vehicular Tunnel Under Construction at Pasadena, Texas, By *W. H. Smith*, Chf. Engr. July, Pp. 52-54, 78.
The Triaxial System and How It Is Used to "Tailor Make" Highways in Kansas. By *W. J. Arndt*, Kansas H'way Com'n. July, Pp. 56-58, 62, 64, 66, 68.

The Surveyor (England)

Experiments in the Marking of Pedestrian Crossings. By Director of Road Research, Dept. of Sci. & Industrial Research. July 8, Pp. 407-409.

Street Subsidence in San Francisco

According to the latest annual report of the Dept. of Public Works of San Francisco, "Six streets in the South of Market area had subsided to such an extent that the sewers serving them were below the main collecting sewers and therefore did not properly function. On two of the streets the roadways and the properties adjacent to them were nearly six feet below official grade and during high tides or heavy rains sewage backed up enough to cover considerable areas." What caused the subsidence was not stated, but some remedy certainly seemed to be called for, and in May, 1948, a contract was awarded for constructing new sewers, raising the roadway to grade and paving it wtih asphaltic concrete. The owners of the adjoining properties, most of which had been built upon, had to protect their buildings at their own expense, and in many cases raise the plumbing so it could drain into the new sewers.

New Type of Asphaltic Concrete

In connection with the widening and repaving of 7th Street in San Francisco, the city used a new type of asphaltic concrete, patterned largely after a mix used by the city of Seattle. It consisted of approximately 65% of ¾-inch maximum gravel without dust, 4 to 5% of asphalt, and regular asphalt sand. This mix worked very well and produced a good non-skid surface.

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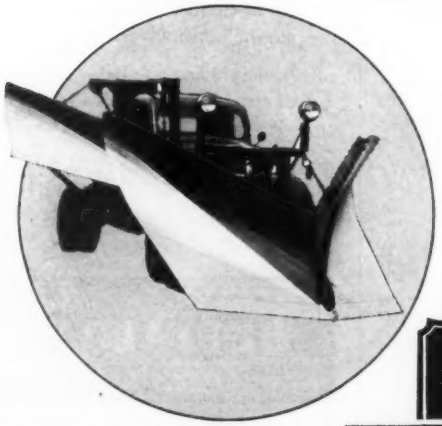

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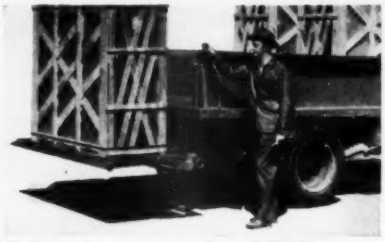

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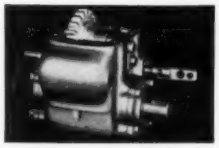

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Planning Refuse Collection

(Continued from page 23)

to save the money and dump along roadsides. It may be difficult legally to compel payment of fees if service is not desired and rendered.

Methods of Disposal

There are several methods of disposal, of which only three are defensible from the view of public health and decency. These are: Incineration, sanitary land fill, and grinding and disposal with the sewage. Feeding to hogs does conserve some food values and this may be of value during war periods; at other times the margin of profit is so small that adequate provision for the animals cannot be made and the refuse remaining from the feeding process creates a tremendous nuisance. Moreover, feeding to hogs requires separation of the garbage at the home, the provision of two containers and of two collection systems.

The open dump is always a nuisance and a prolific producer of flies, rats and mosquitoes. Burning over the dump destroys papers, and other combustible material, but it has no effect on the organic material. The only function burning accomplishes is the prevention of scattering of loose materials; and in return it is likely to increase odors and to cause strong complaints on the part of all residents within reach of the fumes.

Incineration is a very satisfactory method of disposal. The initial cost is relatively high, though recently some small incinerators have been installed at prices between $2,000 and $2,200 per ton of 24-hour capacity. Incineration destroys all organic material and leaves only ash which does not attract flies or rodents. Incinerators can often be located so conveniently to the central point of origin of the waste that reduced hauling costs may result in a favorable overall cost for disposal, including collection.

Sanitary land fill has many advantages where a suitable area for the fill is available. If the ground is suitable and located close in, the first cost and the operating costs will both be low. However, careless or unskilled operation may result in the maintenance of a disposal area that is little better than the old-time dump. The entire efficiency of the sanitary fill from a public health point of view depends on the efficiency with which it is operated.

Grinding and disposal of the garbage into sewers is a relatively new method of disposal which has many advantages. It does increase the load on the sewage treatment plant units. Where home grinders are used, the sewage volume is increased slightly, and the organic loading quite considerably, so that all units of the plant may require additional capacity. If the garbage is collected, hauled to the sewage treatment plant and ground there, only the digestion and solids disposal units will receive the extra load. In any case, the increased cost of handling these organic loads has been computed to be relatively small. Disposal of the garbage in this manner eliminates the most objectionable portion of the domestic wastes. Collection of inorganic wastes must be provided, but is simpler and less costly, as less frequent collections will be possible.

Sewage Sludge for Highway Shoulders

The North Carolina State Highway Department has tried the use of sewage sludge on road shoulders and found it so satisfactory in developing thick, sturdy stands of grass on these areas, which are usually devoid of top soil, that it is anxious to obtain all the dried sludge that the plants in the State can furnish.

Many cities have found sludge to be valuable for soil conditioning. County highway departments might investigate the availability of sludge for shoulders and roadsides.

Street Opening Control Procedures

(Continued from page 25)

ing specifications. All fill is removed from the cut for a depth of 8 ins. below the surface of the old concrete, or to the bottom of the slab if the depth exceeds 8 ins. All sides of the cut are slightly chamfered; all broken fragments are removed, and the exposed concrete is then cleaned and painted with neat cement grout just prior to placing the new concrete. The aggregates and the concrete proportions required by pavement specifications are required in paving the cut area, except that the use of small, portable concrete mixers not equipped with measuring tanks and time-locking devices is permitted. When such mixers are used, the concrete is mixed in the proportion of one sack of cement, 2 cubic feet of sand and 3 cubic feet of coarse aggregate. Hand-mixing is approved only under special conditions.

When the concrete is placed by hand tamping, the slump must be not less than one inch nor more than 3 ins. When air tampers are used, the slump must be not less than half an inch. When thoroughly compacted and tamped, the surface of the concrete must be even with the original surface of the pavement. When the temperature is less than 33°, protection against freezing shall be provided, frozen materials removed from the subgrade, aggregates and water heated and high early strength cement used.

After the concrete has hardened sufficiently to withstand traffic, the paving surface is replaced. Cuts in streets paved with brick or granite blocks are repaved with the same material to the grade and elevation as the original pavement. Sufficient brick or blocks are removed, adjacent to the cut, to permit the bonding of the patch to the original surface with staggered joints. Cuts in asphalt pavements are paved with a temporary surface. The temporary re-paving may be done with brick, by setting in the asphalt that was

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removed from the cut, by the use of cold pack or by combination of old asphalt and cold pack. The temporary repaving must be done in such manner as to prevent the scattering of loose stones or pieces of asphalt over the pavement by action of traffic. The surface of the temporary paving is left ¼ inch higher than the adjacent pavement.

Protection of Work

Every effort must be made to open up to traffic all cuts on main thoroughfares and in intersections at the earliest possible moment. As far as it is physically possible to do so, steel plates of sufficient size shall protect newly placed concrete until the cut is ready to receive a permanent surface. If a temporary surface is used as a closure, the concrete must be of sufficient strength to prevent displacement when opened to traffic. All locations must be properly protected, by barricades, lights, flares or torches, until such time that they are suitable and safe to open to traffic.

All barricades shall be plainly marked with the contractor's identification and only his own barricades may be used on his work.

Upon completion of the work the contractor or utility must notify the Department of Public Works that the tunnel, cut or trench is ready for backfillling or repaving and must maintain the cut until the opening has been repaved with a permanent pavement when the cut is located in a paved street or alley; or until the backfill is completely settled if located back of the curb or in an unpaved street or alley.

Upon completion of the work, all equipment, materials, tools, tool boxes, temporary buildings, excavated materials and other material must be promptly removed from the area. The surface of the street, sidewalk, lawns and private property shall be cleaned, leaving them in as neat, clean and usable condition as originally found. Trees damaged or removed must be replaced. Lawns damaged by the work shall be repaired to the satisfaction of the Department of Public Works.

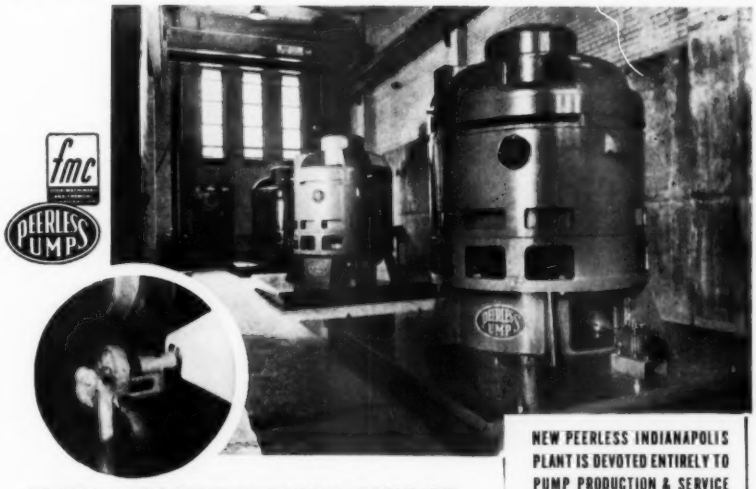
All sidewalks and driveways that have been cut, removed, damaged, tilted or settled in the course of the work, or by settling of the backfill must be repaired. Sidewalk flags and private driveways shall not be patched but shall be replaced. Cuts in large commercial driveways will be considered the same as cuts in concrete pavement and may be repaved as such. All replacement of sidewalks and driveways shall be done in accordance with the standard specifications of the City.

In case of damage resulting from the settlement of the backfill, the person, firm, corporation or department responsible for the cut, trench or tunnel will be billed for the cost of the repairs.

The provision of the Detroit Charter pertaining to cuts in new pavements are as follows:

"SECTION 12. Before any street, alley or other public place shall be paved or resurfaced, notices thereof shall be published by the commissioner in at least three issues of at least two newspapers of the City thirty days or more prior thereto, and copies of such notice shall forthwith be furnished to all public service corporations, all city departments, and to all owners of real estate, so far as it may be possible to locate them, abutting on such street, alley or other public place, in order that such corporation, departments and property owners may lay therein wires, pipes, cables, conduits and the like. After such pavement or resurfacing shall have been completed, it shall not be cut for any purpose or by any person, firm,

WIDEST CAPACITY RANGE



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corporation, or department during the first year thereafter, unless there be paid in advance treble the estimated cost of the restoration of such pavement, and during the second year thereof double the estimated cost thereof, and thereafter the estimated cost. If the actual expense of restoring such pavement after the second year shall exceed the estimated cost, the difference shall be collected from the person, firm, corporation or department, and, if the estimated cost shall exceed the actual expense, the excess shall be refunded. No permits shall be issued for the cutting of the pavement of any boulevard without the approval of the Common Council."

Ice and Snow Control

(Continued from page 38)

hazard. Sand for ice control should be clean, hard, sharp, and free from loam, clay, or frozen lumps, with 100 per cent passing a ⅜-inch sieve, not less than 45 per cent passing a No. 16 sieve, and not more than 30 per cent passing a No. 50 sieve. This sand will provide good traction and will have very little grinding effect on the road surface.

Cinders.—Cinders are sharper than sand and cling to tires and cut into ice better than sand particles. The melting or embedding action of cinders with their great porosity is better than that of sand because of the larger quantity of moisture and chloride held at or near the surface of the cinder particles. Due to their dark color cinders absorb more heat than sand when the sun is shining, which results in greater embedment. Also, cinders have less tendency to clog drainage structures.

Washed Stone Screenings.—Stone screenings, from which the fines have been removed by washing, produce a good abrasive; 100 per cent should pass the ⅜-inch sieve, with not less than 45 per cent passing a No. 16 sieve and not more than 30 per cent passing a No. 50 sieve.

When practical, abrasives should be treated to prevent freezing before application and as an aid to embedding the material in the ice or packed snow so that it will not be blown off the road. Heating the abrasives does not work out well in practice. Treatment with sodium or calcium chloride is the best method of preparing abrasives for treating icy pavements.

Experience has shown that on heavily-traveled highways untreated abrasives whip off the road and that even moderate winds will sweep the material from the surface. Only on light traffic roads or streets free from wind is it possible to keep the abrasives on the road without the addition of chemicals.

Treatment and Stockpiling

When abrasives are placed in storage they should be treated with from 40 to 75 pounds of chloride per cubic yard depending on the moisture content of the abrasive and the temperature. Abrasives that are not treated when stored may be treated as they are loaded into dump trucks prior to being spread on the pavement. For sand and stone screenings containing not more than 4 per cent of moisture, 40 pounds of chloride are recommended; for sand and stone screenings with moisture contents greater than 4 per cent and for all cinder abrasives, 75 pounds are recommended. The protection provided by these amounts of calcium chloride or sodium chloride will assure unfrozen material

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● Continental Chain Link, the only fence made of KONIK STEEL, gives you greatest protection at lowest cost per year of fence life. KONIK is a patented open hearth steel containing copper, nickel and chromium for greater strength—for extra resistance to rust. In the weaving of Continental Chain Link, the KONIK fabric is dipped in a special galvanizing bath which spreads a uniform coating of weather-proofing zinc over every inch of the fence. It will pay you to contact our nearest representative or call us at Kokomo to learn more about this economical, permanent property protection.

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Our fence engineers stand ready to plan and help erect the type of fence "tailored" to your own property. Continental Chain Link fence gives you 14 distinctive construction advantages including stronger gates . . . pivot-type hinges . . . self-locking barb arms . . . 20% more ties.

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When you need special information—consult the READERS' SERVICE DEPT. on pages 81-85

down to zero temperature for even a combination of cinder abrasives with 15 per cent moisture.

The chloride should be well mixed with the abrasive by some practical method at nominal cost.

Where it is not possible to have either a bin or shed, the abrasives should be placed in a stockpile. Such a pile should have a triangular cross-section about 6 feet high and 14 feet wide at the base. It is desirable to cover these piles with waterproof paper or a suitable substitute covering. The degree of protection will depend upon the water tightness of the cover. Since abrasives practically always contain moisture they will freeze if exposed to the weather. Treatment with chlorides will prevent freezing for a period but the chemical will leach out in time if not in water-tight storage and the outer crust, if not the whole pile, will freeze. This effect can be minimized by spreading dry chloride over the top of the stockpile.

Preparation of Road Surface: Application of Abrasives

Before treating a road surface with abrasives or chemicals to prevent skidding on icy surfaces, the snow or loose ice should be removed as completely as possible. Plowing with snow plows or blade graders is the usual practice.

An effective method of preparing the surface is by scoring the ice or packed snow with a saw-tooth blade. The purpose is not to remove the ice but to roughen it in preparation for treatment with abrasives or chemicals. The loosened ice or snow should be removed as soon as possible with conventional plowing blades.

An application of ½ pound to 1 pound of treated sand or cinders per square yard will give a good cover and should make the road non-skid if it is uniformly distributed. When traffic or wind has whipped off the material it may be necessary to re-cover some sections, especially on grades, curves and intersections.

Chemically treated abrasives, or chemicals used alone, should be applied as sparingly as possible to Portland cement concrete pavements. This is because repeated freezings and thawings of concrete in contact with these salts may be conducive to surface pitting or scaling. Never apply the raw chemicals (CaCl or NaCl) to concrete pavements less than 4 years old. Unscaled pavements over 4 years old are relatively free from this danger.

Bethlehem Snow Removal

(Continued from page 33)

during a continuing snowstorm; sometimes they blew away, sometimes additional snow covered them completely. In either event we had to go over the same routes more than once. When the storm ended and the snow was gone, the cinders remained and we had to assign men to sweep them up and clean them out of our catch basins. Last winter there was no such wasted expense.

Our use of rock salt carried so much favorable comment that a number of business firms in the city started spreading it on their sidewalks. We furnish it free to firehouses and churches for this purpose.

To make sure that we have a supply on hand throughout the winter, we stock up in late summer or early in the fall, storing it at our garage. We keep this storage space filled at all times; as a result we are ready for any emergency, and can keep our highways and streets open and safe for traffic.

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Handles 8′ to 12′ widths—up to 12″ deep. Oscillating screed—dual steering—hydraulic brakes—high speed, reverse. Forms not usually required.

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PUBLIC WORKS DIGESTS

THE SEWERAGE and Refuse Digest

The Bio-Phage Nutrient Sewage Treatment Process

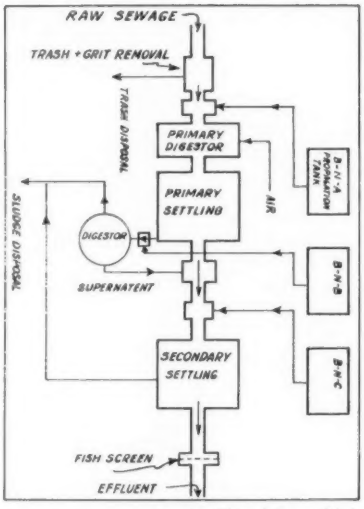
A general outline of a scientifically controlled method of treatment, the details of which are yet to be worked out, is offered by the author. It involves the addition, at selected points in the process, of nutrient hormonic infusions together with carefully cultured, robust specific organisms, of three separate and distinct forms, called *A*, *B*, and *C*. *A* is selected for its ability, in a very short period of time, to convert all organic material to a semi-stable condition which will no longer support their existence. This primary decomposition is enhanced by mild aeration. All colloids are flocculated and gases removed, and sedimentation is very efficient; and the liquid may be stable enough to serve as the final effluent. The sludge from sedimentation is seeded with nutrient *B* in a digester, causing rapid and unbelievably complete digestion. The supernatant, highly charged with *B*, may be added to the effluent from the primary settler, which is seeded with *C* for complete treatment, where this is desired. By providing propagation tanks, supplied with suitable dilutions of the proper hormonic nutrients, pure strains of these selective and specific organisms may be grown. It may be necessary to adjust pH and alkalinity, and to destroy the miscellaneous life forms accidentally present in the raw sewage.

F. P. Fischer—"The Bio-Phage Nutrient Process of Sewage Treatment;" *Water & Sewage Works*, August.

Chemical Stabilization Of Sand for Excavating

In tunneling for a 10-ft. storm sewer of horse-shoe section 2700 ft. long in San Francisco, trouble was caused by occasional occurrence of dry sand, which ran into the tunnel through the smallest openings in the breast boards and exerted a pressure that bent 10" x 10" posts. This difficulty was met by injecting into the sand ahead of and around the tunnel heading a mixture of sodium silicate and sodium bicarbonate, which changed the sand into a firm, self-supporting formation but one easy to spade. Adjusting the proportion of the two chemicals permitted giving a delay in setting of 40 to 80 min. The mixture was pumped through a needle—a 10-ft. length of ½" iron pipe, which was pushed into the sand, using an air-operated reciprocating piston pump. Using a pressure of 200 psi at the needle, the ground was solidified for a radius of about 1 ft. around the point of discharge. The amount of solution required was about 30 to 45 gal. per cu. yd. solidified. In most cases the sand was solidified for 10 ft. ahead of the face, and also overhead and at the sides of the tunnel in extreme cases.

Roy E. Wright—"Chemical Stabilization of Sand Speeds Driving of 10-Ft. Tunnel"; *Engineering News-Record*, Aug. 4.



Courtesy Water & Sewage Works

● ***FLOW DIAGRAM for the Bio-Phage nutrient process.***

Rodent Control

Poison alone will never lick the rat problem; we must remove the food sources and the breeding places. Garbage and trash collection and disposal are of primary importance. Buildings should be rat-proofed. The cost of this if done during construction is practically negligible. Hundreds of chemicals have been tried for poisoning rats. Some are equally poisonous to dogs, cats and humans. One of them, "Antu," rats quickly develop a tolerance for. Red squill is an old standby, and still is probably the best for general use around residences, as it kills al kinds of rats but has practically no harmful effect on other animals. On open-face dumps it is impossible to get 100% kill by poisoning, so it must be repeated at intervals; and it is desirable to vary the poison used, alternating say zinc phosphide, red squill and antu.

H. A. Merrill—"Rodent Control"; *Am. Pub. Works Ass'n Proceedings*, Bulletin No. 52.

Efficiency of Activated Sludge Plants

A study and analysis of operating results from 26 plants, averaged over periods of one to six years, show that the activated sludge process can be expected to remove from 92.5 to 95.0% of the B.O.D. and suspended solids from untreated domestic sewage in properly designed plants. Efficiency is materially affected by variations in quantity and chemical characteristics of the sewage, due in part to industrial wastes. Determination has yet to be made of the interrelation of several factors and the magnitude of others, such as temperature, nitrification, character of returned activated sludge with reference to biological activity, and the B.O.D. loading per unit of aeration tank volume. Many plant upsets that reduce plant efficiency are due to insufficient capacity, inadequate hydraulic design of settling tanks, or the return of excessive quantities of waste activated sludge and digester supernatant.

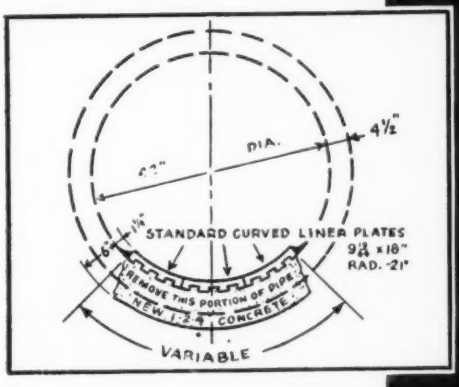
William E. Stanley—"Factors Affecting the Efficiency of Activated Sludge Plants"; *Sewage Works Journal*, July.

The term "sludge age" is used

Clay Liner Plates

SALVAGE RELIEF SEWER SYSTEM

THE Engineering Department of Cudahy, Wisconsin, recently devised an unusual method of salvaging a non-vitreous relief sewer which had disintegrated from constant attack by sulphuric acid discharged from a nearby drop forge plant. Vitrified Clay Liner Plates were used to replace the invert of the sewer to take care of the high-acid waste material flowing through the line. The sewer arch, which had not been in contact with the waste material, was saved.



Clay Pipe Passes A. S. T. M. Acid Test With Plenty To Spare

Forty-eight hours suspended in fiery solutions of sulphuric, nitric, hydrochloric, or acetic acids . . . that's the rugged A. S. T. M. test for acid resistance! And Vitrified Clay Liner Plates come through without so much as a pockmark! That's the reason Clay is specified by leading engineers the world over for sewerage and waste disposal systems of all kinds. Clay Pipe and Clay Liner Plates are made from nature's own chemically inert material . . . it *never wears out!*

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to represent the average number of days the sewage solids remain in the aeration system, calculated by dividing the weight of the suspended solids in the aeration tanks by the weight of suspended solids added to the tanks daily. R. H. Gould believes that for activated sludge a sludge age of 3 days is necessary and 4 is desirable. The use of step aeration and the concept of sludge age are important factors in improving the efficiency of the activated sludge process. Step aeration adds great flexibility to the handling of heavy organic loads and the determination of the sludge age permits a rapid analysis of one of the most important factors—loading.

Gail P. Edwards, in a discussion of Mr. Stanley's paper.

Utilizing Gas From Digester Sludge

Digester sludge gas generally ranges in quantity from 0.6 to 1.25 cu. ft. per capita per day. If used directly for heating the digestion tanks, all of it is required for this purpose. If used for operating gas engines, the heat rejected to jacket and exhaust can be recovered and used for sludge heating. A typical large plant with high pump heads, high air rate, deep aeration tanks, long sludge lines etc., requires 250 kwh per million gallons of sewage for pumping, 450 kwh for air and 100 kwh for auxiliaries, lighting, etc.; a total of 800 kwh. For chemical treatment, deduct the 450 kwh for air. Small plants with low pumping head require still less. A high gas yield of 8,000 c.f. per m.g. will generate 320 kwh., which might be adequate for a low-lift plant without aeration. In calculating the economy of such a plant, allowance must be made for 100% standby capacity of equipment to insure continuity of operation. As both power demand and gas yield fluctuate, either there must be considerable waste of gas at times or provision of supplementary power at others. The latter is greatly aided by the use of dual fuel engines. In one method of use of gas, the engines are directly connected to blowers. In some cases a synchronous type motor is so connected to the engine as to act as generator with the blower unclutched, or as a motor with the engine unclutched, and thus the unit can be operated as engine-generator, engine-blower, or motor-blower.

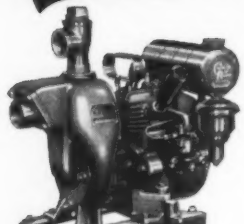
Flexibility and reliable continuity are served by converting all the gas engine power to electricity so that any engine can operate any unit. Then 2 engines and 2 pumps are in effect 4 sets, and 3 of each give 9 combinations, thus minimizing the effect of minor failures. This transmission of power through motors causes some theoretical loss of efficiency, but this is more than compensated for by the increased flexibility and reliability. An electric plant, including voltage regulators, automatic synchronizing and other accessory devices, will cost perhaps $250 per kw load, which should be increased to $350-$450 by providing standby units. The overhead on this plus the operating payroll are such that the utilizing of gas power would be economical only where the power bill approximates $50,000 a year.

Victor Greiff—"Electrification of Sewage Treatment Processes"; *Sewage Works Engineering*, August.

First-Stage Oxygen Demand

The writer believes that, for approximating the true strength of sewage in terms of reducing power, the most promising line of attack is measurement of the first stage or carbonaceous oxygen demand. The

COMPARE O. S. C. SEPTIC TANK CLEANING



GORMAN-RUPP'S NEW "MIDGET" 1½" PUMP

FASTEST, self-priming, most efficient pump for general use. Weighs but 62 lbs. -- pumps 5500 GPH -- self-primes up to 30 ft. -- non-clogging, sturdy. Gorman-Rupp builds a complete line of pumps from the "HANDY", delivering 8 GPM, to large capacity pumps which deliver as high as 125,000 GPH.

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When a Sanitary Service Operator puts a new Gorman-Rupp Odorless Sanitary Cleaner on the job these are the results:—

1. A disagreeable job becomes pleasant, easy work.
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3. It does each job more thoroughly, in a fraction of the time previously required. For example, 500 gal. tanks are cleaned in 15 minutes, 1000 gal. tanks in 20 minutes.
4. It offers operators profit possibilities far in excess of income with present equipment and methods.
5. An O. S. C. unit has other profitable uses such as transporting water, emergency fire fighting, sprinkling, dewatering, etc.

Show this to Sanitary Service Operators in your community. For complete information write for Bulletin 7-ST-11.

THE GORMAN-RUPP COMPANY
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When you need special information—consult the READERS' SERVICE DEPT. *on pages 81-85*

second-stage oxygen demand is of considerably less importance from a treatment standpoint, except where highly nitrogenous trade wastes are present. Use of total first-stage B.O.D. as a measure of sewage strength should make possible a more rational expression of the relationship between treatment plant loading and performance. Such use is also indicated in the study of sewage pollution loading on streams.

George A. Rhame—"Determination of First-Stage Oxygen Demand"; *Water & Sewage Works*, August.

Activated Sludge For Industrial Wastes

The activated sludge process provides reliable and economic treatment for most industrial wastes, but must be designed scientifically. The correct aeration period is that necessary to reduce the oxygen demand by 20 to 25% of its original value—usually about 6 or 8 hr. When treating domestic sewage, it was found that if 33% by volume of corn canning waste be added to domestic sewage, the aeration period should be 16 hr. The amount of air needed was 0.8 cfm per gallon for domestic sewage, but was 1.8 cfm when the corn waste was added. Mechanical aeration is recommended for plants treating up to 0.5 mgd; diffused aeration for larger plants, and possibly for smaller ones treating very strong industrial waste. A plant treating domestic sewage combined with cannery waste with equivalent population four times as great reduced the B.O.D. 93%. Plants treating packing house wastes gave 98% reduction in one case when combined with domestic sewage, and 84% in another where there was no domestic sewage. Plants treating dairy wastes have produced reductions from 93% to 99.5%.

Miles Lamb—"Treating Industrial Wastes by the Activated Sludge Process"; *PUBLIC WORKS* August.

Test Holes on Line of Proposed Sewer

To provide information concerning subsoil and ground-water conditions which would aid in estimating cost and could be offered to contractors to aid them in bidding and in construction of a sewer line 32½ miles long of 12" to 90" diameter, the engineers of the County Sanitation Districts of Orange Co., Calif., drilled 141 holes to an average depth of 16 ft. (3 ft. below the invert of the proposed sewer, at a cost of $1.44 per lineal foot. Where possible the test holes were located near, but not on, street intersections. In addition, information was obtained from pri-

CHEMCO Type M-5
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0-10 lbs. per 24 hours

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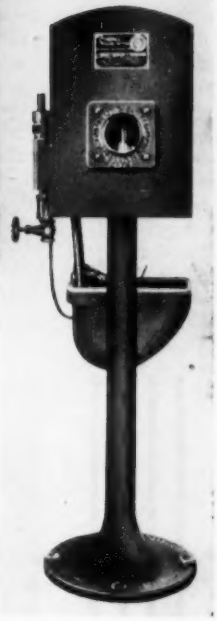

Chemco Chlorinators are the result of nearly 25 years experience in water treatment and are used in 42 of the 48 states and foreign countries...They have outstanding design features as shown below...

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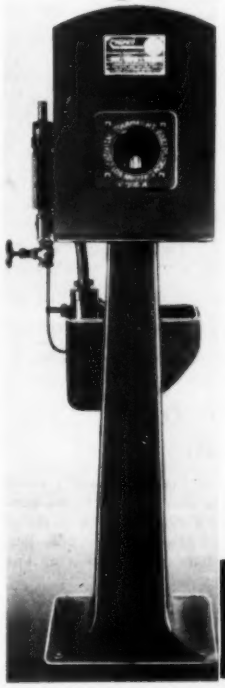
lbs. per 24 hours



CHEMCO Type M-1
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2 *CHEMCO Chlorinators are all based on vacuum design.*

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vate and public utility companies of the location of their gas lines, oil lines, telephone cables, power conduits, water mains, sewers, etc.

For drilling the holes, a 16" bucket was used on the end of a 22 ft. Kelly bar, equipment commonly used in Southern California by cesspool drillers. The drill buckets had hinged bottoms containing two cutting knives. When filled, they were brought to the surface and emptied. Samples were taken whenever there was a change in the type of soil; and kept in pint fruit-canning jars. These, together with the drilling logs, were made available to all bidders.

Vinton W. Bacon—"Soil Test Holes Reduce Risk in Estimating Cost of Trunk Sewers"; *Water & Sewage Works,* August.

Trickling Filter For Chemical Wastes

The Mansfield, Mass., plant of the Hercules Powder Co. manufactures various types of synthetic resins and the wastes contain resin and resin oils, formaldehyde, sodium formate, organic acids and domestic sewage. The plant had a total B.O.D. load of approximately 2,000 lb. per 24 hr., ranging from 300 to 10,000, and formaldehyde concentrations up to 5,000 ppm. Dry-weather flow of the receiving river had an allowable loading of 75 lb. of B.O.D. a day, of which it was thought that this plant was entitled to 30 lb., which required a B.O.D. reduction from 2,000 to 30, or 98½%. Experiments seemed to show that these wastes would prove toxic if added to the municipal sewage which was treated in an Imhoff-trickling filter plant. No practicable method of chemical destruction could be found. Certain considerations suggested the possibility of using a high-rate filter, and a pilot plant was constructed and operated for 8 months. It was concluded that the high-rate trickling filter can provide satisfactory reduction of formaldehyde and organic oils and acids. Values of pH as low as 4.5 and as high as 8.5, if maintained uniform, did not affect operation. Short sedimentation periods are effective. There is no filter fly problem. The rate of application should be sufficiently high to maintain a high sloughing rate. It was concluded that toxicity is only relative; bacteria can be developed that will thrive in so-called toxic mediums and provide satisfactory removal of organic material.

B. W. Dickerson—"A High-Rate Trickling Filter Pilot Plant for Certain Chemical Wastes"; *Sewage Works Journal,* July.

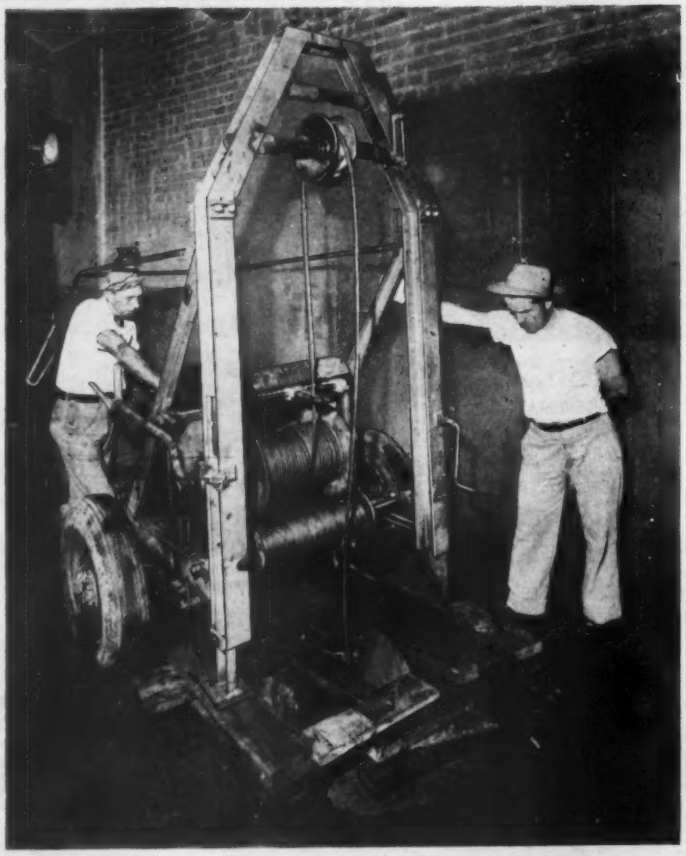
Treating Meat Packing Wastes

Meat packing wastes are high in nitrogenous matter and low in carbohydrates. They can and should be kept as low as domestic sewage in grease.

Methods are now available to keep blood, grease, tank water, paunch manures, and other screenings out of the sewers. Most of these materials are too valuable to discharge into the drains, and they are the chief agents of trouble in a sewage disposal plant.

Conventional methods of treating sewage are satisfactory for treating meat packing wastes. However, more extensive research is needed to establish the exact effects of mixing meat packing wastes with domestic sewage for treatment, and to determine the optimum ratio of the two wastes which will give best results.

It is believed that meat packing wastes should be mixed with high carbohydrate wastes before treatment whenever possible to make a better biological medium for growth of microorganisms. It is well known



KANSAS CITY BUYS 2ND SET OF "FLEXIBLE" POWER BUCKET MACHINES *(even cleans sewers from cramped basement quarters!)*

Within less than a year from the date Kansas City purchased its first set of Power Bucket Machines this equipment had so completely demonstrated its speed, efficiency and versatility that a second set was ordered—another "on-the-job" proof of performance.

Extreme flexibility of the equipment is shown above. This machine was lowered to the basement of a Kansas City factory in a freight elevator to clean a trunk sewer line. "Flexible" Machines go where the job is and clean lines speedily and at low cost.

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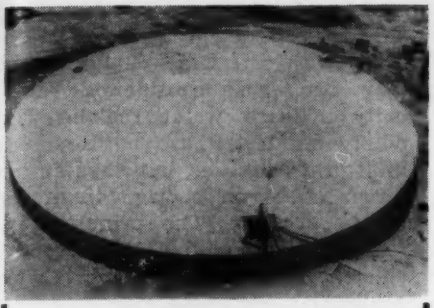

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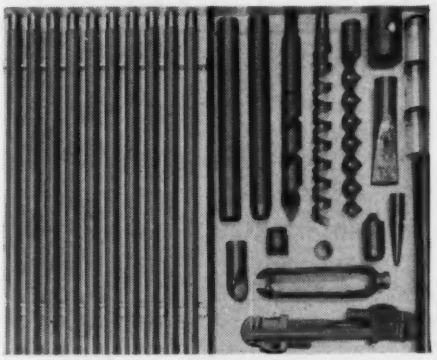

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that carbon and nitrogen must be kept at an optimum ratio in soils for best crop production. Recent successful application of sodium nitrate to wastes from canneries in lagoons is based largely on the same principle. Abundant nitrogen and oxygen which are immediately available, reduce B.O.D. and make a suitable medium for the microflora.

D. H. Nelson—"Meat Packing Wastes and Their Pretreatment"; *Sewage Works Engineering*, August.

Digestion of Yeast Waste

Effluents from compressed yeast manufacture contain 7,000 to 15,000 ppm of soluble volatile material with BOD values of 2,000 to 15,000 ppm, but only 50 to 200 ppm suspended solids. Sludge accumulation in digesters therefore is slow, and loss of sludge from them is high because of the finely divided state of the sludge particles and entrainment of gas on them. It is, however, essential that sufficient seed sludge be retained in the tank to be mixed with the incoming waste. Neutralization of the raw spent nutrient to about pH 6.5, with concomitant increase in alkalinity, results in greater retention of sludge in the digesters and improves sedimentation of sludge in a subsequent settling tank. Spray recirculation of the digester effluent, by separation of the entrained gas, enhances settling of sludge. Drainability of digested yeast sludge is poorer than of digested sewage sludge.

Willem Rudolfs and Eugene H. Trubnick—"Compressed Yeast Waste Treatment"; *Sewage Works Journal*, July.

Biology of Sewage Treatment

Almost all complete treatment of sewage is biological. Anaerobic methods favor an enormous development of bacteria, fungi and less well known organisms. Aerobic methods favor these and also protozoa, rotifiers, worms and often crustacea, insects and snails. Virtually no animal life is known to be part of anaerobic sewage digestion, which is assumed to be largely a bacteriological process; the yeasts and other fungi possibly concerned are very little known. In activated sludge and trickling filters zoogleal bacteria are probably most abundant, and filamentous bacteria and fungi are present. Zooglea can be effective in reducing B.O.D. in the absence of any other organism, but the possible role of other bacteria

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and fungi in reducing B.O.D. has never been shown satisfactorily. The abundance of fungi and many other colorless plants (possibly yeasts and actinomycetes) indicates a large but unknown role in purification. The animals of aerated processes are well known. Many of them, by eating bacteria, tend to maintain the biologic balance. Probably a useful function of the higher organisms is to keep the beds open, provide good aeration and reduce ponding.

James B. Lackey—"Biology of Sewage Treatment"; *Sewage Works Journal*, July.

Detergents and Sewage Treatment

The use of detergents is increasing rapidly but they still represent only a comparatively small percentage of the total soap production. In general, replacement of soap by detergents will reduce the strength of sewage. The effect of detergents on sewage plant units is not uniform, some detergents having a greater effect than others. Settling devices may be affected, producing a poorer effluent. Increased BOD in the effluent from settling tanks may affect secondary treatment devices. The replacement of soaps by detergents may have the greatest effect in areas with soft water supplies, but may also cause considerable difficulty in hard water regions. The detergents tested are not toxic to biological activities, but have an indirect effect on sewage treatment plant operation. The principal effects appear to be: (1) decreased efficiency of settling tanks, with consequent increased load on trickling filters; (2) foaming, floc agglomeration and carry-over in activated sludge units; and (3) reduction in gas production from sludge digestion.

Willem Rudolfs, Raymond Manganelli and Isaiah Gellman—"Effect of Certain Detergents on Sewage Treatment"; *Sewage Works Journal*, July.

Wastes From Chemical Manufacturing

These include soluble organic substances, soluble inorganic substances, inorganic acids, alkaline wastes, tars and oils. Measures being investigated by the chemical industry for preventing and abating stream pollution are: 1. Recovery of by-products for plant use or sale. 2. Modification of productive processes to eliminate or reduce pollution. 3. Treatment of waste liquors with no monetary return. 4. Diversion, with or without preliminary treatment, to municipal disposal plants. 6. Controlled dilution in receiving waters.

Raymond W. Hess—"Wastes From Chemical Manufacturing;" *Sewage Works Journal*, July.

Use of B.O.D. in Industrial Waste Treatment

"The chemical industry is greatly concerned as to the significance of the standard methods of analyses for pollution characteristics in their relationship to the effects of wastes on the stream. It is of the opinion that the B.O.D. determination leaves much to be desired in this connection, but uses it in the absence of some better test." Raymond W. Hess.

"The B.O.D. test is a useful tool in measuring pollution. Used properly, it can tell many things concerning the relative strength, the toxicity, and the treatability of a waste. The industry does object, and very strongly, to the test as a standard for industrial effluent or for receiving water, and would question the value of empirical formulas based on the B.O.D. test to determine how much treatment is necessary." Thomas J. Powers.

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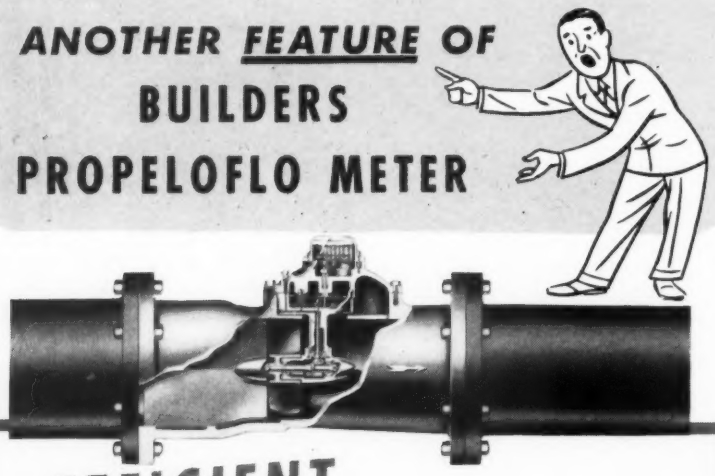

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but there is a great deal more to be learned about it when measuring industrial wastes." B. W. Dickerson.

"There has been considerable criticism of the B.O.D. test for industrial wastes, but the writers believe that it gives fairly consistent results for coking wastes." K. N. Bundy and P. E. Jordan.

The above are quotations from several papers published in the July issue of *Sewage Works Journal*.

BIBLIOGRAPHY

American City

Cold-Weather Operation of Sanitary Land Fill. By *K. S. Krause*, Iowa Dept. of Health, and *C. W. Hamblin*, City Engr., Mason City, Iowa. August, Pp. 108-109.

American Public Works Ass'n Proceedings

Refuse Disposal—Old and New. By *Mark B. Owen*, Consult. Engr., Public Works Congress of 1948, Bulletin No. 55, Pp. 3-26.

Rodent Control. By *H. A. Merrill*, U. S. Dept. of the Interior. Bulletin No. 52, Pp. 3-8.

Sewage Works Engineering

Meat Packing Wastes and Their Pretreatment. By *D. H. Nelson*, Chf. Chemist, Oscar Mayer & Co. August, Pp. 382-384.

Dual Sewage-Storm Water Pumping Station. By *Nussbaumer & Clarke*, Consult. Engrs. August, Pp. 385-386.

Electrification of Sewage Treatment Processes: Producing Power from Sludge. By *Victor Greiff*, Chf. Electr. Sect., Bur. of Sew. Disp., New York City. August, Pp. 387-389, 400.

Instrumentation of Sewage Treatment: Controlling Sludge Elutriation, Conditioning and Filtration. By *A. O. Pearson*, Brown Instrument Div. August, Pp. 390, 400.

Engineering News-Record

Chemical Stabilization of Sand Speeds Driving of 10-Ft. Tunnel. By Roy E. *Wright*, Philadelphia Quartz Co. of Calif. Aug. 4, Pp. 42-43.

Public Works

Treating Industrial Wastes by the Activated Sludge Process. By *Miles Lamb*, Chicago Pump Co. August, Pp. 24-26.

Suburban Area Starts 400-Mile Sewer System. August, P. 33.

Refuse Collection and Disposal Practices in Maryland. By *Edgar G. Heyl*, Sen. Asst. San. Engr., Maryland Dept. of Health. August, Pp. 40-41.

Sewage Works Journal

Effect of Certain Detergents on Sewage Treatment. by *Willem Rudolfs, Raymond Manganelli* and *Isaiah Gillman*, of Rutgers University. July, Pp. 605-612.

Quantitative Relationships in the Activated Sludge Process. By *L. S. Kraus*, Chemist, Greater Peoria San. Dist. July, Pp. 613-624.

Factors Affecting the Efficiency of Activated Sludge Plants. By *William E. Stanley*, Prof. San. Eng., Mass. Inst. of Tech. July, Pp. 625-642.

The Oxygen Requirements of Activated Sludge Determined by Manometric Methods. By *P. S. S. Dawson* and *S. H. Jenkins*, Research Asst. and Chief Chemist, Birmingham, Tame & Rea Distr., England. July, Pp. 643-658.

Biology of Sewage Treatment. By *James B. Lackey*, The Blakiston Co. July, Pp. 659-667.

Dairy Waste Disposal. By *Edward F. Eldridge*, Chf. Engr., Washington State Pollution Control Com'n. July, Pp. 668-673.

Wastes From Chemical Manufacturing. By *Raymond W. Hess*, Head of Pollution Research, Allied Chemical & Dye Corp. July, Pp. 674-684.

A High Rate Trickling Filter Pilot Plant for Certain Chemical Wastes. By *B. W. Dickerson*, San. Engr., Hercules Powder Co. July, Pp. 685-693.

Waste Control in a Coke Plant. By *K. N. Bundy* and *P. E. Jordan*, Asst. Tech. Advisor and Tech. Advisor Wheeling Steel Corp. July, Pp. 694-699.

Compressed Yeast Waste Treatment; Sludge Formation; Characteristics and Changes. By *Willem Rudolfs* and *Eugene H. Trubnick*, Rutgers University. July, Pp. 700-710.

Legal Indices of Stream Pollution. By *Don E. Bloodgood*, Prof. San. Eng., Purdue Univ. July, Pp. 711-718.

Chlorine Cylinder Rupture at Ridgewood Sewage Treatment Plant. By *John W. Hood*, Supt. Sewage Plant, Ridgewood, N. J. July, Pp. 720-721.

Operating Problems from Tannery Wastes at Ballston Spa. By *William Porter*, Supt. of Sewerage, Ballston Spa., N. Y. July, Pp. 738-743.

The Surveyor (England)

Excerpts From Some Forty Years' Experience of Sewage Purification and Rivers Pollution Prevention. By *J. H. Garner*, Chf. Inspector, West Riding of Yorkshire Rivers Bd. July 15, Pp. 423-424. July 22, Pp. 439-440.

Refuse as a Soil Restorer. By *Thomas Vickers*. July 29, Pp. 451-452.

Water & Sewage Works

Soil Test Holes Reduce Risk in Estimating Cost of Trunk Sewers. By *Vinton W. Bacon*, San. Engr. of Orange Co., Calif. August, Pp. 290-294.

Determination of First-Stage Oxygen Demand. By *George A. Rhame*, San. Engr. August, Pp. 317-321.

The Bio Phage Nutrient Process of Sewage Treatment. By *F. P. Fischer*, Wallace & Tiernan Co., August, Pp. 322-323.

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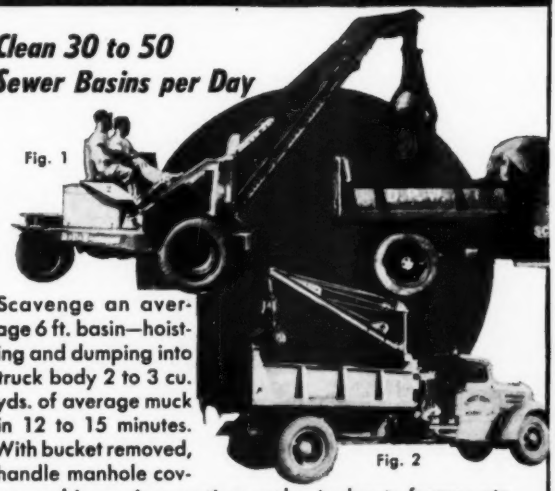

Fig. 1

Fig. 2

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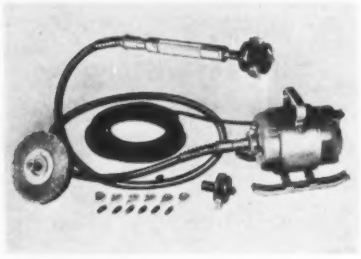

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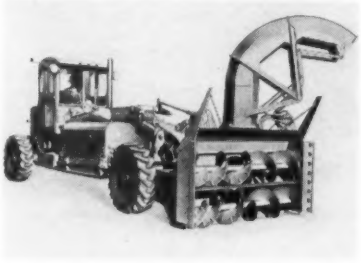
Austin-Western is now the sole distributor of the Sicard Snow Master Rotary plow when used as a grader attachment. This provides the power available in a 4-wheel drive and steer motor grader for this highly efficient rotary snow



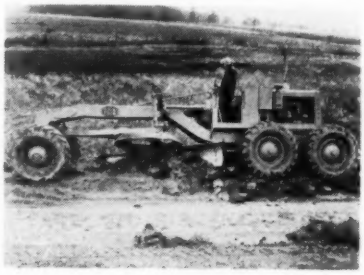
Puts snow in its place.

plow. The Sicard plow permits wholly controllable casting of snow; it can be cast throughout a 220° arc for any desired distance from 3 ft. to 150 ft. Trucks can be loaded in the front or on either side of the machine. All controls are easily at hand and permit the operator to place the snow exactly, missing driveways, intersections and other places where piling up of snow usually results in complaints on the part of taxpayers. For Full data on installation and use, write Austin-Western Co., Aurora, Ill.

Use coupon on page 81: circle No. 9-4

Heavy-Duty Huber Motor Grader

This powerful new motor grader weighs 24,000 pounds without a scar-



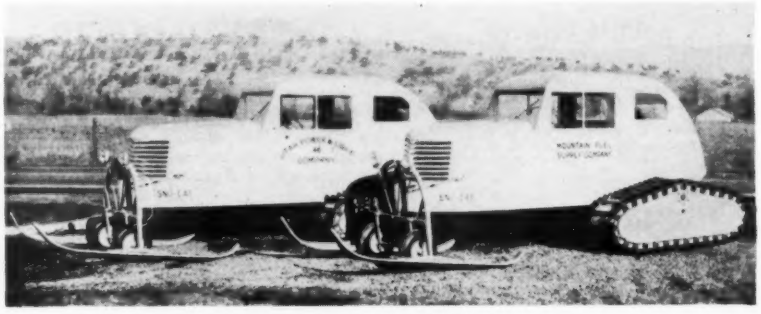
Handles heavy jobs.

ifier and 28,500 pounds with one. Blade pressure is 12,440 to 14,620 pounds. There are 8 speeds forward and two reverse. This new grader is designed for the heaviest and most precise types of work. Full information from Huber Mfg. Co., Marion, Ohio.

Use coupon on page 81; circle No. 9-5

Mechanically Cleaned Sewage Screen with Grinder

This is an automatic, mechanically cleaned screen, with an optional screenings grinding attachment. It is designed for channels from 2'6" to 5'0" wide, with a minimum depth setting of 2'6". Total height of the mounting is only 5 ft. Bar spacings recommended for sewage treatment are ¾" to 1½"; ½" inch openings



Tucker Sno-Cats out looking for snow.

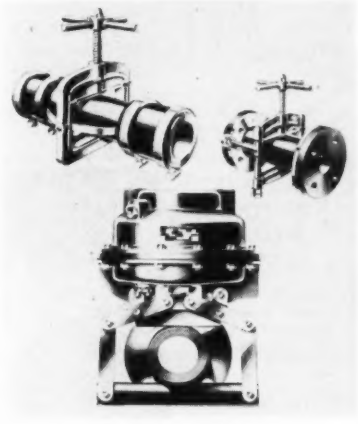
are also available. A booklet gives quite a lot of design data and contains helpful illustrations. Sent on request to American Well Works, Aurora, Ill.

Use coupon on page 81; circle No. 9-6

Flexible Valve Has No Internal Parts

This is a new-type of valve which has no internal parts or obstructions, is not affected by abrasive materials or water hammer, and is non-clogging and absolutely tight. The valve is made in three types—slip-on in sizes from ½-in. to 2½-in.; flanged end, from 1-in. to 12-in.; and diaphragm motor, from 1-in. to 10-in. It is especially adapted to lines carrying sewage; materials containing solids; air; and chemicals. Ask for Catalog 50 which contains full data. Flexible Valve Corp., Palisades Park, N. J.

Use coupon on page 81; circle No. 9-7



No "innards."

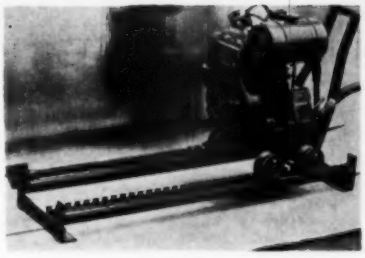
Finding Snow-Covered Hydrants

Up where it snows a lot, this device will help in quickly locating hydrants despite deep snow. A pole 3 or 4 ft. long, with a luminescent flag 7" long, is attached to each hydrant by a permanent mounting clamp that fits all hydrants. The lock mechanism that fastens the pole to the bracket is thief-proof. For full information, write to Highway Marker Division, American Metal Products, 34 Southbridge St., Worcester, Mass.

Use coupon on page 81; circle No. 9-8

Laying Pipe Without Digging

Pipe up to 3 inches in diameter can be put underground for distances up to 150 ft. with this boring machine. You can hit within 1 inch of the target, according to the manufacturers. Three types of bits are available for various types of soil. Designed for laying lines where surface excavation would be costly or inconvenient. Complete information from Lube Jack Co., 1415 14th St., Santa Monica, Calif.



Lube Jack's earthworm borer.

Use coupon on page 81: circle No. 9-9

A Hydro-Pneumatic Tank Calculator

A calculator gives fast and accurate determination of the best water level for all operating conditions in pressure water tanks. The calculator, which is of the cardboard slide rule type, is based on the Boyles law. It tells the best air-water ratio, the most efficient pressure differential,

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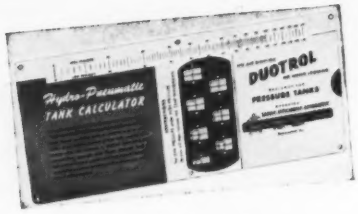


Tank level calculator.

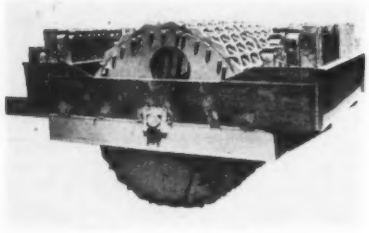
the exact amount withdrawn with any pressure drop and the resultant reserve or residual. This calculator was developed by the Automatic Control Co., 1005 University Ave., St. Paul 4, Minn.

Use coupon on page 81: circle No. 9-10

Grid Roller for Compaction and Maintenance

In addition to its use for compacting earth (in much the same manner as the sheepsfoot roller, though on a different principle), this roller is effective in salvaging and maintaining bitumious pavements. After scarifying, it pulverizes the pieces, compacts the subgrade and then consolidates the broken-up surfacing ready for final treatment. Cleaners are provided on the inside of the grids. Weight can be adjusted. Ask for Booklet 1126. Hyster Co., Portland 8, Oregon.

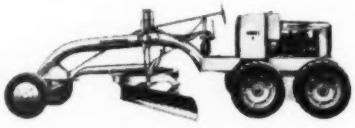
Use coupon on page 81; circle No. 9-11



This will settle things.

A Grader for Low Cost Maintenance and Light Construction

A new 8,500-pound Model "D" grader with 34.7 hp, specially designed for low cost maintenance and light construction work, has been announced by Allis-Chalmers. It has many big grader features. Tandem drive rear wheels, a short turning radius, accurate and quick blade control, speed of 18.61 mph and strong cylindrical frame are factors stressed by the manufacturer. Handy accessory equipment is available, including scarifier, hydraulic loader, all-view cab and special snowplow. Full details from Allis Chalmers Mfg. Co., Milwaukee 1, Wisc.



For lots of light work.

Use coupon on page 81; circle No. 9-12

Rust Inhibitor Paint

Penetrating ability and great capillary attraction, permit this paint called End-O-Rust, to prevent oxygen, acids, salts and other elements from reaching the metal and setting up galvanic action. This material has a low acid value and a low oxidation rate. It withstands extreme expansion and contraction and corrosion, as well as fire. Applied by brush, spray or dip. Al-Tex Products Co., 1900 Euclid Ave., Cleveland, O.

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MAGNETIC DIPPING NEEDLE $17.50

with 3 section telescoping handle $22.25

Write Today for 68-Page Catalog

W. S. DARLEY & CO.
Chicago 12

SPARLING MAIN-LINE METERS

Efficient water works operation is based on correct information regarding main line flows. Each Sparling Meter is a complete totalizing unit, installed just as simply as a length of the pipe itself.

The cost is very moderate, accuracy is guaranteed within 2 per cent, and the pressure loss is negligible.

Flow-rate Indicators, Recorders and Controls can be added as needed—now or later.

Bulletin 310 is your guide to modernizing a plant. It shows types of Sparling Meters for all lines 2-inch and up, the Instruments and Controls available—with Prices.

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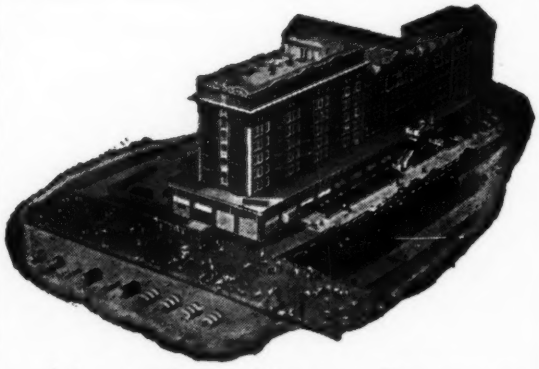

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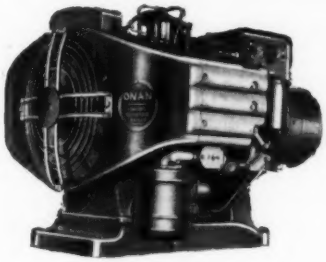
Low Cost Power With 5KW Diesel Electric Plant

The opposed 2-cylinder air-cooled diesel engine that powers this plant is responsible for its smooth and



Low cost power.

vibration free operation, according to the manufacturer. Design is compact; the weight is 725 pounds less batteries. No special base is required, nor is bolting down. Write D. W. Onan & Sons, Inc., Minneapolis, Minn. for full description.

Use coupon on page 81; circle No. 9-14

IHC 16-Horsepower Gasoline Engine

This new engine is designed for powering fans and blowers, oil or water pumps, generators, portable units and other similar installations.

IHC 16-hp. engine.

It will operate on gas or gasoline; 2500 rpm; weight 280 pounds. This is the U-1. Full data from International Harvester Co., 180 North Michigan Ave., Chicago 1, Ill.

Use coupon on page 81; circle No. 9-15

National Council for Community Improvement

The annual meeting of this organization will be held at the Warwick Hotel, Philadelphia, Pa., Oct. 11 and 12. Panel discussions are aimed to cover (1) How to develop the community level; (2) how to reach community leaders with the business story; and (3) how to bring all phases of the community together to exchange viewpoints in a friendly and understanding manner. Barrett L. Crandall, 1760 K St., N. W., Washington 6, D. C., is executive secretary.

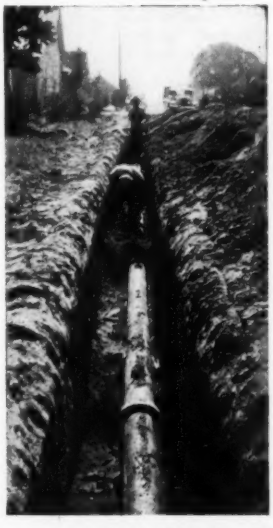
Sterling Pumps and Generators at APWA Meeting

The Sterling Machinery Corp., 405-13 Southwest Blvd., Kansas City, Mo., will not only have a booth, C-35, at the APWA meeting to be held at Kansas City Sept. 18 to 21, but also will hold welcome house for those who attend the convention.

The Sterling display will include three of their self-priming centrifugal pumps. These pumps, which are of aluminum alloy, for light weight so as to be easily moved from place to place, are but a part of the line of Sterling pumps, which are made in sizes from 1½ to 10 ins. with capacities up to 200,000 gals. per hour.

In addition, Sterling will exhibit one of their gasoline powered generating plants for night lighting or power; also welders, battery chargers and a light-weight gasoline engine driven lawn mower. Sterling also manufactures saw rigs and hoists.

Easy To Cut—Easy To Tap
Easy To Lay!



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For quick installations use McWane B&S cast iron pipe.

Easy to cut . . . handle . . . tap . . . lay. Meets rigid Standard Class 150 Federal Specifications, 500-pound test.

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PROMPT SHIPMENT
4" and Larger Sizes

ALL SIZES 2" thru 12"

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Birmingham 2, Alabama

JAEGER SLASHES PUMPING COSTS

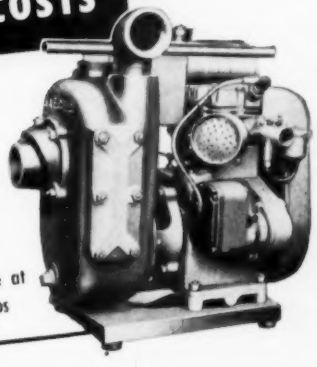
2" aluminum pump with 4 h.p. engine

Pumps 9000 gph

Sure-primes at 25 ft. lift in less than 1 minute

Weighs only 105 lbs.

High head performance at price of low head pumps



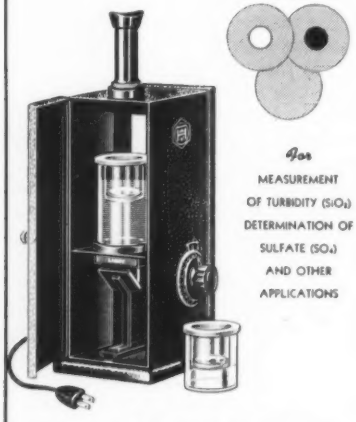
The first feather-light pump with big capacity and pressure, armored against wear with stainless steel shell fitting, hardened liner plate and impeller, and long-life Lubri-Seal. Powerful new Wisconsin ABN engine, maintains big volume even at heads well above 100 feet. Two men easily carry its 105 lbs. Also available on cushion or pneumatic tires. Ask your Jaeger distributor or send for Bulletin LP-9 and prices.

The JAEGER MACHINE Co.
Columbus 16, Ohio

1½" to 10" Dewatering and Pressure Pumps, Jetting Pumps, Diaphragm Pumps

COMPRESSORS • MIXERS • HOISTS • PAVING EQUIPMENT

HELLIGE
TURBIDIMETER
A TURBIDIMETER WITHOUT STANDARDS
Accurate • Foolproof • Universal



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INDEX OF ADVERTISEMENTS

Acker Drill Co., Inc.	71
Albright & Friel, Inc.	74
All Purpose Spreader Company	65
Alvord, Burdick & Howson	74
Anthracite Equipment Corporation	82
Arnessen Electric Company, Inc.	55
Atlas Mineral Products Company	57
Ayer-McCarel-Reagan Clay Company	37
Baker, Jr., Michael	74
Banister Engineering Company	74
Barker & Wheeler	74
Baughman Mfg. Company, Inc.	47
Black & Veatch	74
Bogert Assoc., Clinton L.	74
Bowe, Albertson Assoc.	74
Bowerston Shale Company	37
Brown Engineering Company	74
Buck, Seifert & Jost	74
Buffalo Springfield Roller Company	59
Builders-Providence, Inc.	72
Burns & MacDonnell Eng. Company	74
Caird, James M.	74
Capitol Engineering Corporation	74
Carter Co., Ralph B.	84
Centriline Corporation	12
Chemical Equipment Company	69
Chester Engineers	74
Chicago Bridge & Iron Company	19
Chicago Pump Company	3
Coff, L.	74
Cole & Son, Chas. W.	74
Consoer, Townsend & Assoc.	74
Continental Steel Corporation	64
Corson, Oscar	74
DeLeuw, Cather & Company	74
Dempster Brothers, Inc.	17
Dickey Clay Mfg. Co., W. S.	37
Dolge Co., C. B.	50
Dorr Co., The	49
Dow, A. W., Inc.	74
Flexible Sewer Rod Equipment Company	70
Flintkote Company	16
Foote Company, Inc., The	83
Ford Meter Box Company	56
Ford Motor Company	4
Frink Sno Plows, Inc.	60
Gannett, Fleming, Corddry & Carpenter, Inc.	74
Giant Mfg. Company	80
Gilbert Associates, Inc.	74
Goff, William A., Inc.	74
Goldak Company	80
Gorman Rupp Company	68
Greeley & Hansen	74
Green Co., Howard R.	75
Hagan Corporation	6
Harco Corporation	86
Harnischfeger Corporation	40
Harte Co., John J.	75
Heil Company	61
Hellige, Inc.	80
Hill & Hill	75
Hitchcock & Estabrook	75
Hotel Strand	78
Hydraulic Development Corporation	71
International Harvester Company	2
Irving Subway Grating Company	86
Jaeger Machine Company	79
Jeffrey Mfg. Company	45
Johns-Manville	10 & 11
Jones, Henry & Schoonmaker	75
Kennedy, Clyde C.	75
Knowles, Inc., Morris	75
Koch & Fowler	75
Layne & Bowler, Inc.	53
Lewis, Harold M.	75
Littleford Bros., Inc.	46
Lock Joint Pipe Company	87
Lozier & Company, Wm. S.	75
McCray Co., F. G.	75
McWane Cast Iron Pipe	79
Metcalf & Eddy	75
M & H Valve & Fittings Company	50
Moore & Owen	75
Motorola, Inc.	39
Murdock Mfg. & Supply Company	86
National Clay Pipe Mfrs., Inc.	67
National Fireproofing Corporation	37
Novo Engine Company	83
Pacific Flush Tank Company	80
Palmer & Baker, Inc.	75
Peerless Pump Division	63
Permutit Company	18
Phelps, Inc., Boyd E.	75
Pirnie Engineers, Malcolm	75
Pitometer Company	75
Pomona Terra-Cotta Company	37
Pressure Concrete Company	71
Proportioneers, Inc.	Front Cover
Quinn Wire & Iron Works	82
Robert & Company, Inc.	75
Roberts Filter Mfg. Company	51
Roots Connersville Blower Corporation	14
Russell & Axon, Cons. Engrs.	75
Rust-Oleum Corporation	85
Sicard Industries, Inc.	8
Silent Hoist & Crane Co.	73
Skinner Co., M. B.	84
Smith Corporation, A. O.	13
Smith & Gillespie	75
Sparling, R. W.	78
Stanley Engineering Company	75
Sterling Mach. Corporation	77
Stilson & Assoc., Alden E.	75
Superior Engine Division	9
Tarrant Mfg. Company	48
Taylor, Henry W.	75
Texas Vitrified Pipe Company	37
Trickling Filter Floor Institute	37
Trojan Mfg. Company	82
Tucker Sno-Cat Corporation	15
Wallace & Tiernan Co., Inc.	Back Cover
Wayer Impactor Sales Company	73
Wertz & Assoc., Emerson D.	75
Wood Company, R. D.	54

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FINDS THOSE PIPES!
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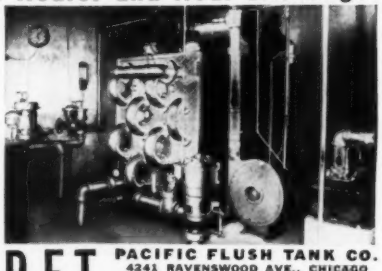
P. F. T. Digester Heater and Heat Exchanger
. . . does away with constantly decreasing heat transfer, greatly reduces the labor of cleaning coils, and minimizes the operating interruptions encountered in the conventional method of heating digestion tanks. Ask for Bulletin 135.



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NEW LISTINGS

Helpful Tool Cuts Rust Removal Costs

155. Maintenance costs on bridges, tanks, every steel structure, are cut with the Arnessen Electric Chipping Hammer. Easily portable machine cuts rust quick and clean, provides smooth painting surface. Bulletins from Arnessen Electric Co., Inc., 116 Broad St., New York 4, N. Y. give full data.

"Tailor-Made" Pumps Fit Your Requirements

156. Application-Engineered vertical turbine pumps to suit your particular pumping requirements are completely described in Bulletin P-178. Details of optional driving and pumping arrangements clearly illustrated. Get your copy from A. O. Smith Corporation, Dept. PW, Milwaukee 1, Wisc.

Handbook on Glass Block Construction

165. It's easy to add the modern touch to public buildings, large and small, by the use of good-looking glass blocks. This 40-page handbook includes tables for estamating materials, technical data on light and heat transmission, crushing strength, specifications. Ask for A.I.A. File No. 10-F, Pittsburgh Corning Corp., 307 Fourth Ave., Pittsburgh 22, Pa.

Specifications for Sludge Pumps

166. Complete specifications and performance curves on sludge pumps are included in bulletin S-48 issued by Marlow Pumps, Ridgewood, N. J. Data covers both plunger and diaphragm types.

How to Protect Your Water Tank

167. How to stop steel tank rust by the cathodic protection method is clearly described in bulletins issued by the Rusta Restor Div., Harco Corp., 2156 East 4th St., Cleveland 15, Ohio. Be sure to check this lasting protection against rust.

Traveling Cranes For Incinerators

168. Helpful literature on P & H Traveling Cranes for incinerator service will provide engineers with full data on this fast, flexible, low-cost refuse handling equipment. Get Bulletins on P & H Incinerator Cranes, Harnischfeger Corp., 4412 West National Ave., Milwaukee 14, Wisc.

Dependable Power For Every Purpose

170. Rugged Novo engines are built to handle heavy-duty loads; operate on gasoline, kerosene, gas-gasoline. Several models range from 4 HP to 32 HP. Get bulletins from Novo Engine Co., Lansing, Mich.

Hydraulic Dump Bodies Feature Trouble-Free Hoist

171. Get data on Heil Twin-Arm hoists and bodies for 1½ to 2½ ton trucks and learn how reliable hoist and sturdy body will keep your truck in service with less repair and maintenance. Bulletin BH 4662-G gives details. The Heil Co., Dept. 4499, 3044 W. Montana St., Milwaukee 1, Wisc.

How to Get Accurate Subsurface Information

172. For positive knowledge of subsurface soil conditions an accurate sample is needed. The compact and complete Acker Soil Sampling Kit includes 12 soil and earth sampling tools. Get details in Bulletin 26. Acker Drill Co., Inc., Dept. PW, Scranton 3, Pa.

Thrifty Salt Spreading for Salt and Ice Control

173. Check the Tarco "Scotchman" for fast, thrifty salt application to icy roads. Stainless steel spreader has weatherproofed engine. Get all data from Tarrant Mfg. Co., Jumel St., Saratoga Springs, N. Y.

Travel on Snow Easy With "Sno-Cat"

177. For directing snow plowing operations, inspection of isolated utilities, all winter operations involving travel over deep snow and up steep grades, check the Tucker "Sno-Cat." This powerful pontoon-equipped tractor negotiates easily under all snow conditions. Get illustrated data from the Tucker Sno-Cat Corporation, Medford, Oregon.

SEWERAGE AND REFUSE

Sanivan Features Faster Refuse Loading, Greater Capacity

31. Compression loading plate on the Sicard Sanivan crushes ordinary loose garbage into ⅛ original space. For clear, cutaway views of this positive compression action and mechanical full discharge get the "Sanivan" bulletin. Write Sicard Industries, Inc., 2055 Bennett Ave., Montreal 4, Canada.

New Unit Cleans Catch Basins in a Jiffy

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

How to Lower Costs Of Refuse Collection

35. For saving trucks, labor, and time in city rubbish collection get details of the new Dumpster-Kolector described in literature just published by Dempster Bros., Inc., 996 Higgins, Knoxville 17, Tenn.

Packaged Sewage Treatment— Just Right for Small Places

36. "Packaged" Sewage Treatment Plants specifically developed for small communities — 100 to 3,000 population. Write for full description and actual operating data for this type of plant. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.

Ask for This Design Data On Sprinkling Filters

43. Design data on sprinkling filters of Separate Nozzle Field and Common Nozzle Field design as well as complete data on single and twin dosing tanks, and the various siphons used in them, for apportioning sewage to nozzles. Many time-saving charts and tables. Write Pacific Flush Tank Co., Dept. P.W., 4241 Ravenswood Ave., Chicago 13, Ill.

Odorless Sanitary Septic Tank Cleaning

88. The Gorman-Rupp Odorless Sanitary Cleaning unit combines centrifugal self-priming pump, air-cooled engine and oval tank on a sturdy frame. For full description of this adaptable unit get bulletin 7-ST-11. Gorman-Rupp Co., 120 N. Bowman Ave., Mansfield, Ohio.

Underdrains—Hidden But Important Filter Components

113. For filter bottoms this firm makes "Armcre" vitrified salt glazed floor blocks which provide ducts occupying 50% of the floor cross-section and air openings

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Booklets from Pages 81-85:

20	21	22	26	27	28	31	33	34	35	36	38
39	41	43	44	48	52	53	58	64	65	68	73
76	77	80	81	84	85	87	88	90	93	94	95
96	102	104	106	108	109	111	112	113	114	116	121
122	124	125	126	130	131	132	133	135	136	137	138
141	143	146	147	148	154	155	156	158	159	162	165
166	167	168	170	171	172	173	174	175	176	177	

New Products, Pages 74-79:

9-1 9-2 9-3 9-4 9-5 9-6 9-7 9-8
9-9 9-10 9-11 9-12 9-13 9-14 9-15

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aggregating over 24% of the floor area. Described in several leaflets and data sheets. Ayer-McCarel-Reagan Clay Co., Brazil, Ind.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connersville Blower Corp., 712 Poplar Ave., Connersville, Ind.

How to Make Sewage Plant Grit Suitable for Fill, Roadways

138. The Jeffrey "Jigrit" washer does a thorough job of scrubbing grit free of organic solids. Grit is classified according to size and organics rejected with overflow. 44-page Catalog 775A describes the "Jigrit" and gives engineering data and installation views of grit and sludge collectors, chemical feeders, garbage grinders and other equipment as well. Dept. PW, Jeffrey Mfg. Co., 948 N. Fourth St., Columbus 16, Ohio.

Check "Gunite" Concrete For Every Application

158. Big 44-page book illustrates "Gunite" uses for both repair and new construction of sewers, tanks, dams, swimming pools, and all concrete structures. A multitude of applications. Be sure to check coupon or write Pressure Concrete Co., Dept. PW, 315 S. Court St., Florence, Ala.

POWER AND LIGHT

Dual Fuel Engines for Municipal Power

27. A new 8-page illustrated bulletin, No. 4811, describes Superior Dual Fuel Diesel engine operation and illustrates the simplicity of controls with fuel conversion by either push buttons or hand lever. Copies are available from Superior Engine Div., Dept. PW, The National Supply Co., Springfield, Ohio.

Diesel Engines With Opposed Pistons

143. The opposed-piston idea is joined with principles of diesel combustion to provide economical operation in municipal, private utility and commercial power plant applications. You'll find colorful, detailed data on this remarkable diesel engine in Bulletin 3800D-1, Fairbanks, Morse & Co., 600 So. Michigan Ave., Chicago 5, Ill.

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

CONSTRUCTION EQUIPMENT

Data Book on Universal Concrete Cribbing

21. Shows typical sections for designing walls, pictures many applications, specifications, etc. Get the facts today about this economical reinforced concrete cribbing. Universal Concrete Pipe Co., Dept. PW, 297 So. High St., Columbus 15, Ohio.

Two-Way FM Radio Telephone Equipment for All Departments

26. For booklet describing and illustrating the Motorola Two-Way Radio Telephone or for specific recommendations concerning your application write to Dept. PW, Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Ill.

Solve Your Drainage Problems This Easy, Permanent Way

28. Useful new 60 page catalog on standard corrugated pipe, multi-plate pipe and arches and 18 other drainage and related products for culverts, sewers, subdrains, flood control, airports, water supply and other types of construction. Ask for "Armco Products for Engineering Construction," Armco Drainage and Metal Products, Inc., Dept. PW, Middletown, Ohio.

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wisc.

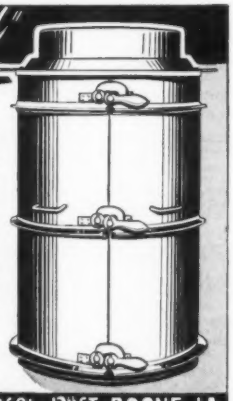
Improved Special Rollers Help Cities and Counties

84. Road and street widening are speeded up with Buffalo-Springfield trench rollers of improved design. Many other special compacting problems handled by the portable KT-6 model. Get engineering specifications in bulletins TR-3B and KT-6 from Buffalo-Springfield Roller Co., Springfield, Ohio.

Contractors' Pump Features Carryability

93. To find out how well a Homelite Carryable Pump handles large volumes. seepage, mud, write today for illustrated bulletin L-503 containing data of great value to all pump users. Write Dept. PW, Homelite Corp., 2102 Riverdale Ave., Port Chester, N. Y.

THE "Quinn Standard" FOR CONCRETE PIPE



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The TROJAN pipe puller and pusher — Cuts Costs! Saves Time!

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MODEL A—for ½" to 1" pipe. One man can lift in and out of trench and install average service. Weighs only 65 lbs. Special design and all steel construction makes possible 15 tons of pushing pressure.

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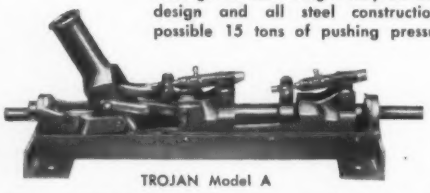

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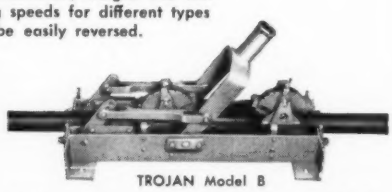

TROJAN Model B

The TROJAN Manufacturing Co., 441 East Water St., Troy, Ohio

When you need special information—consult the **READERS' SERVICE DEPT.** *on pages 81-85*

52-Page Data-Packed Bulletin On Contractors' Pumps

95. Tables for pump size determination on every excavation job, pipe friction loss, attitude effects and lots of other valuable data are included in this comprehensive booklet illustrating the many Jaeger "sure-prime" pump applications. Get your copy (catalog P45) by checking our coupon or writing the Jaeger Machine Co., Dept. PW, Columbus 16, Ohio.

Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

The Right Tractor For Your Job

116. Whether you need a front-end loader, snow plow, bulldozer, sweeper or mower, International wheel tractors combine correctly with allied equipment to do the job. Your choice of gasoline or diesel units is illustrated in Bulletin A-103JJ. International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

SNOW FIGHTING

For High-Speed Snow Removal

44. "Frink One-Way Sno-Plows" is a four-page catalog illustrating and describing 5 models of One-Way Blade Type Sno-Plows for motor trucks from 1½ up to 8 tons capacity. Interchangeable with V Sno-Plow, Frink Sno-Plows, Inc., Clayton, 1000 Islands, N. Y.

Chemical Stops Salt Corrosion

174. A new chemical has been developed which, when mixed 1 pound to 100 pounds of salt, prevents any corrosion of automobiles by the salt. Harmless; colorless; odorless. Permits free use of salt for ice and snow control without complaint by drivers. Calgon, Inc., Pittsburgh, Pa.

WATER WORKS

What You Should Know About Hypochlorination

20. This really helpful booklet tells you a lot about hypochlorination of water for small and medium sized supplies, swimming pools and main sterilization, and fully describes the application of manual and automatic "Chem-O-Feeders" for constant or proportional feeding of chemicals. Send for Bulletin SAN-8 issued by Proportioneers, Inc., 96 Codding St., Providence 1, R. I.

Is Your City Metered 100%?

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cutaway views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Do Your Water Mains Need Cleaning?

38. Literature on Flexible method of cleaning water mains any size from 2" to 72", giving full details and list of nearest representatives in all parts of country. Address: Flexible Underground Pipe Cleaning Co., 9059 Venice Blvd., Los Angeles, Calif.

Solve Corrosion Problems With This Special Alloy

41. "Everdur Metal" is title of an 8-page illustrated booklet describing ad-

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RUGGED -- DEPENDABLE
ENGINES
FOR HEAVY-DUTY LOADS

- FUELS — Gasoline; Kerosene; Gas-Gasoline
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This 2 cylinder water-cooled engine (Model CWR-66) develops 10 to 15 H.P. at speeds of 1200 to 2200 R.P.M. Other models available: Air-cooled, 4 to 7 or 5 to 8 H.P.; Water-cooled, 10 to 15 or 22 to 32 H.P. Let us know your specific needs.

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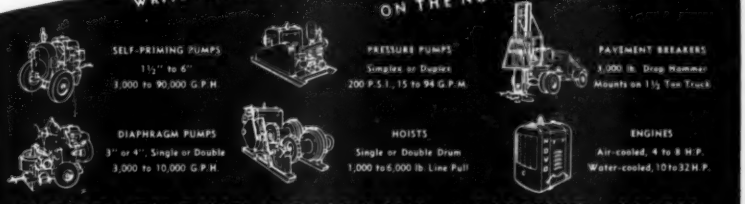

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THE Foote Kinetic Asphalt Mixer will give you 8 to 10 more batches from a barrel of asphalt. One user* has reported savings of $5.22 a ton. They used to buy their material for $10.50 a ton. Now they make it with the Foote Kinetic Asphalt Mixer for $5.28 a ton. $5.22 a ton is worth saving! Such savings will soon pay for your Foote Kinetic Mixer.

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- 3 cu. ft. in 30 seconds.
- High output for low investment
- Handles any cold mix without auxiliary equipment. Can handle hot mixes in conjunction with kettles.
- Fully portable.
- New mixing principle thoroughly coats every particle of aggregate. Gives you 8 to 10 more batches out of every barrel of asphalt.

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vantages of this corrosion-resisting alloy for sewage treatment equipment, reservoir, and waterworks service. Dept. P.W., the American Brass Co., 25 Broadway, N. Y. C.

Eliminate Taste and Odor From Your Water

53. Technical pub. No. P.W. 213 issued by Wallace & Tiernan Co., Inc., Newark, 1, N. J., describes in detail taste and odor control of water with Break-Point Chlorination. Sent free to any operator requesting it.

Helpful Data on Hydrants

64. Specifications for standard AWWA fire hydrants with helpful instructions for ordering, installing, repairing, lengthening and using. Issued by M. & H. Valve & Fittings Co., Dept. P.W., Anniston, Ala.

Cast Iron Pipe and Fittings For Every Need

65. Cast iron pipe and fittings for water, gas, sewer and industrial service. Super - deLavaud centrifugally - cast and pit-cast pipe. Bell-and-spigot, U. S. Joint, flanged or flexible joints can be furnished to suit requirements. Write U. S. Pipe and Foundry Co., Dept. PW, Burlington, N. J.

Recording Meters for Parabolic Flumes

73. Engineering data on parabolic flumes and accurate companion meters for open flow water and sewage metering is given in Simplex bulletin 210. Installation data and calibration included. Write Simplex Valve and Meter Co., Dept. 4, 6750 Upland St., Philadelphia 42, Pa.

Turbidity, Color and Hardness Removal

77. Modern water pre-treatment with Dorr equipment and methods is described in Bulletin No. 9141, which gives basic design data and flowsheets for pre-treating highly turbid water, color removal or treatment of low turbidity, and softening. Typical analyses for various types of waters are given together with detention times in recommended treatment units. Write The Dorr Co., Dept. PW, 570 Lexington Ave., New York 22, N. Y.

Job Data Offered on New Steel Water Lines

80. A 12-page illustrated report listing pipe diameters, pipe wall thicknesses, line pressures, coatings, engineering personnel, etc., is entitled "A Report of Dresser-Coupled Steel Water Lines in the Year 1948." A copy will be sent by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa.

Speedier, Space-Saving Purification Apparatus

81. A new 12-page bulletin, No. 2204, tells how the Spaulding Precipitator, in removing impurities from a liquid by precipitation, adsorption, settling, and upward filtration, occupies less space, uses less chemicals and speeds up treatment. Permutit Co., 330 West 42nd St., New York 18, N. Y.

How to Estimate Quantity Of Joint Compound Needed

87. The uses of Tegul-Mineralead for bell and spigot pipe and G-K Sewer joint compound are described in bulletins issued by Atlas Mineral Products Co., Mertztown, Pa. Includes useful tables for estimating quantities needed.

Concrete Forms For Every Need

94. There's a form for your need whether it's concrete pipe for sewer, drain or irrigation; forms for roads, bridges, tunnels or manholes; or a special form problem. For folders telling just what these concrete forms can do for you write Dept. PW, Irvington Form & Tank Corp., 43 Cedar Street, New York 5, N. Y.

Tested Jointing Materials

102. "Hydrotite" is a self-caulking, self-sealing joint compound for bell and spigot pipes. For data book and sample write Hydraulic Development Corp., 50 Church St., New York, N. Y.

Pipe That Is Immune to Tuberculation and Corrosion

104. Transite Pipe. The high strength and low weight of pipe moulded under pressure from asbestos fibre and cement, together with its immunity to tuberculation and corrosion is the subject of a 32-page pamphlet. Johns-Manville, Box 290, New York 16, N. Y.

Pressure Pipe That Retains Capacity

106. Several bulletins describing the construction of pressure pipe, list of installations, carrying capacity tests, making service connections under pressure; and detail descriptions of several installations. Lock Joint Pipe Co., Box 269, East Orange, N. J.

How About Centrifugal Pumps?

108. Centrifugal Pumps of various designs—single-stage, double-suction, split casing; single-stage single-suction; two-stage opposed impeller; three-stage; high-pressure; fire pumps; close-coupled. A bulletin for each type. Write to Dept. P.W., Peerless Pump Div., Food Machinery and Chemical Corp., 301 W. Ave. 26, Los Angeles 31, Calif.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Rust Wastes Your Money

121. You'll want data on the all-purpose anti-rust coating that can be brushed or sprayed on all metal surfaces, even those already attacked by rust. For full information on this firm, elastic coating write Rust-Oleum Corp., 2443 Oakton St., Evanston, Ill.

Do You Ever Have Leaks to Fix?

124. You'll want to know about the full line of "Skinner-Seal" clamps for repairing bell and socket joint leaks and broken mains. Step-by-step procedures are illustrated in catalog 41, a handsome 40-page presentation which shows applications of all fittings. Write M. B. Skinner Co., Dept PW, South Bend 21, Ind.

Be Sure You Know How Much You Pump

125. Sparling Main-Line water meters are suited for your metering needs at pumping station and treatment plant. Recording, automatic and remote control units are described in bulletin 310. R. W. Sparling, Box 3277, Los Angeles, Calif.

Find Buried Pipe The Goldak Way

131. Finding buried pipe is easy with the new Featherweight Goldak Pipe Locator. An easy-to-read illustrated bulletin tells the full story quickly. Address: The Goldak Co., 1544 Glenoaks Blvd., Glendale 1, Calif.

All About Cement-Mortar Lining of Water Mains

133. Here, in a really beautiful booklet, is practically everything you need to know about this method of lining mains in place—the needs, methods, and results that will interest you. Centriline Corp., Dept. PW, 140 Cedar St., New York 6, N. Y.

Here's Data on All Swimming Pool Needs

135. Well illustrated bulletin describes filters, water softeners, hydrogen ion plants, chlorine feeders and complete equipment for swimming pools, etc. Copy sent on request by Dept. PW, Chemical Equipment Co., 223 Center St., Los Angeles 54, Calif.

When you need special information—consult the **READERS' SERVICE DEPT.** *on pages 81-85*

Data on Chlorinizer Now Available

132. Bulletin 840-F2 features the Builders Chlorinizer and shows complete details of apparatus to accurately meter chlorine gas and deliver controlled chlorine-water solution. Positive rate of flow indication, wide metering range. Get your copy of this bulletin from Builders-Providence, Inc., 16 Codding St., Providence 1, R. I.

Turbidity Measurements Without Special Standards

141. The Hellige Turbidimeter is designed to avoid tedious suspension standards preparations and provide accuracy in the lower ranges by using the Tyndall Effect. Catalog 8000 shows exactly how this instrument operates and how it is used. Write Hellige, Inc., Dept. PW, 3718 Northern Blvd., Long Island City 1, N. Y.

Newly Designed Watersphere—the Modern Elevated Tank

146. A handsome leaflet describes the newly redesigned Watersphere, built in capacities from 25,000 to 250,000 gals., 50 to 125 ft. to bottom. Sphere is supported on a single, gracefully curved column. Be sure to investigate this tank of pleasant appearance and modern welded construction. Data from Chicago Bridge & Iron Co., 2115 McCormick Bldg., Chicago 4, Ill.

Durable Gratings and Treads Are a Good Investment

147. Gratings for walks around settling tanks and other parts of treatment plants, both out-doors and in, for stairways, floors and balconies, are described in an illustrated 16-page bulletin by Irving Subway Grating Co., 5053 27th St., Long Island City 1, N. Y.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

Helpful Book Gives Pipe Flow

159. This handy 40-page pocket size book titled "Measurement of Water Flow Through Pipe Orifice with Free Discharge" explains the Layne pipe orifice meter method of computing water flow. Includes flow graphs for various size pipes. Layne & Bowler, Inc., Box 215, Hollywood Station, Memphis 8, Tenn.

Continuous Operation Trojan Pipe Pusher

175. New, larger pipe pusher and puller handles pipe up to 2", has three pushing speeds. Fittings handle lead and copper pipe too. Get full details showing how to speed up water service installations. Write Trojan Mfg. Co., 441 E. Water Street, Troy, Ohio.

STREETS AND HIGHWAYS

Strong, Speedy, Low-Cost Maintainer Has Many Uses

22. BG Maintainer, a powerful speedy, low-priced machine for light road maintenance. Full details in illustrated folder. Huber Mfg. Co., Dept. PW., Marion, Ohio.

Your Property Is Worth Good Protection

39. When installing link fence you want protection against rust and corrosion as well as vandalism. Investigate chain link fence made of "Konik" metal described in "Planned Protection" published by Continental Steel Corp., Kokomo, Ind.

Speed Your Work With These Powerful Motor Graders

48. Two powerful Galion motor graders designed to answer every requirement for more speed in road, airport, dam and housing construction work are fully described in a folder illustrated with many action pictures. Issued by Galion Iron Works & Mfg. Co., Galion, Ohio.

Latest Maintenance Equipment For Blacktop Roads

52. "Blacktop Road Maintenance and Construction Equipment" — Asphalt and tar kettles, flue type kettles, spray attachments, tool heaters, surface heaters, road brooms and rollers. This is modern and up-to-date equipment for blacktop airport and road construction and maintenance. Write for Catalog R. Littleford Bros., Inc., 452 East Pearl St., Cincinnati 2, Ohio.

Dependable Self-Priming Pumps

68. Sterling centrifugal self-priming pumps are available in 1½" to 8" models, rated by A.G.C. standards. Get Pump Bulletin AGC-1 giving capacities over wide range of head. Data on wheel mounted units, belt and electric motor driven pumps. Sterling Machinery Corp., 405 Southwest Ave., Kansas City 10, Mo.

How to Beat the Weed Problem

85. Be sure to investigate weed control with selective chemical weed killers. Ask for bulletins on Dolge products that will rid roadsides, parks and lawns of the weed nuisance. C. B. Dolge Co., Dept. PW, Westport, Conn.

Just Right for Fast, Small Asphalt Mixes

90. The Foote Kinetic Mixer delivers 3 cu. ft. in 30 seconds. Portable and easily operated. Get Bulletin K-100 from The Foote Co., 1954 State St., Nunda, N. Y.

Light Weight Machine Does Work of Heavy Roller

111. For compacting hot or cold patching material be sure to investigate the Wayer Impactor, 2,000 blows per minute tamps, finishes and cures. All data in Bulletin 25-8. Wayer Impactor Sales Co., 12 N. Third St., Columbus 15, Ohio.

Fast, Efficient Skid-Proofing

114. Get full facts about Baughman Light-Weight Cinder Spreaders, fast operators for cinders, sand, salt, chips, etc. Free flowing at low temperatures. 9-17 cu. yd. capacity. Write Baughman Mfg. Co., Dept. PW, Jerseyville, Ill.

How to Speed Curb and Gutter Work

126. Here's a 24-page bulletin illustrating form set-ups for every type of curb and gutter work. Send for Bulletin 2259 and learn how to speed up the job with Blaw-Knox Steel Street Forms. Write Blaw-Knox, Dept. PW, Farmers Bank Bldg., Pittsburgh 22, Pa.

Adhesive Joint Sealers and How They Are Applied

130. Learn how joints are prepared and Flintseal Hot-Poured Joint-Sealing compound applied. Series of pictures shows each step and explains every operation for good joint construction. On request from The Flintkote Co., Dept. PW, 30 Rockefeller Plaza, New York 20, N. Y.

Uniform Spreading 2 to 10 ft. Wide

136. Saves labor, spreads 0 to 100 lbs. a sq. yd., dusts up to 1" material forward, reverse, on curves, hills or straightaway. Assures uniform, even density of spread. Write for bulletin: Dept. PW, All Purpose Spreader Co., Fuller Road, Elyria, Ohio.

Modern Sweeper Speeds Street Cleaning

162. The Austin-Western Model 40 sweeper features three wheel design, front wheel steer, for easy maneuvering; rear broom to sweep dirt and refuse directly into 2-yd. hopper; built-in flushing device. Diagrams showing all operations and full specifications in Bulletin AD-2042, issued by Austin-Western Co., Aurora, Ill.

Truck or Tractor Mounted Catch Basin Cleaners

176. Both tractor and truck type, full powered Silent Hoist catch basin cleaners are available to speed your maintenance job. Investigate these units, complete and ready for mounting on your truck, or already installed on "Krane-Kar" tractor. Get Bulletin 67 from Silent Hoist & Crane Co., Dept. PW, 844 63rd St., Brooklyn 20, N. Y.

RUST is Deadly to Metal

Once started, rust destroys relentlessly. Around the clock it ravages property, machinery, equipment, sash and structural steel in public buildings, water works, sewage disposal plants, etc. This metal-consuming scourge rolls up an annual damage bill that costs the nation — including federal departments, states and municipalities—in excess of $6 billion a year. Where there's metal —there's rust — unless protective steps are taken.

Stop This Destroyer With

RUST-OLEUM

You'll find RUST-OLEUM the perfect answer to the problem of stopping rust, indoors or out. It adds years of extra use to all metal equipment and surfaces — roofs, gutters, smokestacks, fire escapes, underbody of trucks and automobiles, and hundreds of other rustable properties. Furthermore, even where rust has already begun, Rust-Oleum prevents further damages. It can be applied directly to rusted surfaces—by brush, dip or spray—and dries to a firm, elastic protective coating that is highly resistant to rain, snow, dampness, calcium chloride, salt air, heat, fumes and ordinary weathering.

Tell Us About Your Rust Problems

Prove the protective qualities of Rust-Oleum to your own satisfaction. If you have a rust problem, give us the details. We will send you full information on Rust-Oleum with specific recommendations for application. *It's available in aluminum and all colors including white.* RUST-OLEUM Corp., 2443 Oakton St., Evanston, Ill.

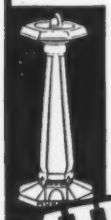
See Our Complete Catalog in Sweet's, or Write Today!

RUST-OLEUM
Stops Rust

A CHALLENGE!

Many cities are woefully deficient in providing facilities for assuaging the natural thirst of their citizens.

At downtown street corners, around public buildings, at transfer points as well as neighborhood playgrounds there is a glaring need for additional outdoor drinking fountains.



This lack affords a challenge to perform a worthwhile public service.

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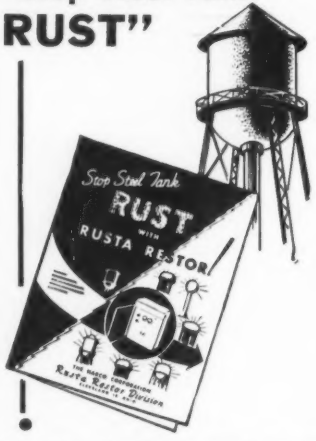
LARGE ANTI-FREEZING HYDRANTS 1½" TO 2" INCLUSIVE

GET YOUR COPY of how to "Stop Steel Tank RUST"



This informative brochure will give you a complete picture of the *CATHODIC PRINCIPLE* of providing complete, lasting protection against expensive, destructive rust in your water tanks. Tells how Harco puts it into operation, how it prevents rust, where it can be used, specifications — and how to go about putting this information to use in eliminating rust damage. Write to Harco Corp., 2158 E. 4th Street, Cleveland 15, Ohio. Simply ask for *"Stop Steel Tank Rust"* and include name and title, please. There is no obligation, of course.

HARCO CORPORATION

WORTH TELLING

By Arthur K. Akers

Samuel B. Applebaum is announced as manager of the Cold Process Water Treating Division of **Cochrane Corporation,** Philadelphia, and vice president of the **Liquid Conditioning Corporation,** now a Cochrane operating subsidiary.

S. B. Applebaum

●

The Dorr Company is moving its main offices in December from 570 Lexington Avenue, New York, to Stamford, Conn. The New York address will be continued, for the convenience of company executives, visitors, and as a branch sales office.

●

Mortimer A. (Tim) Clift, formerly manager of the sanitary engineering department of the **Nichols Engineering and Research Corporation,** New York, is now sales representative for Nichols Engineering & Research Corp., Simplex Valve and Meter Co., The Eimco Corp., Ralph B. Carter Co., Hydro-Ash Corp., and Shallcross Controls Inc., with headquarters at 815 Berkley Road, Indianapolis 8.

M. A. Clift

●

Russell W. Knode is new assistant manager of the export division of **The Jeffrey Manufacturing Company,** Columbus, Ohio.

●

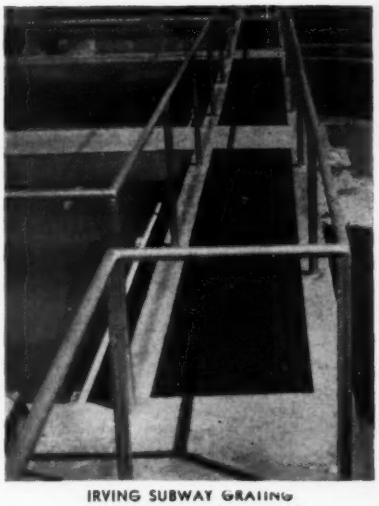
J. H. Yearling, with **Jaeger Machine Company,** Columbus Ohio, for 22 years, moves up from manager of advertising and research to general sales manager.

●

Johns-Manville has a new 32-minute sound, color movie. Keyed to the importance of pure water, Transite pipe for conveying it gets into the narrative, too. The film is non-technical, intended for engineers and water works men as well as town meetings and interested lay groups. Write Johns-Manville, 22 East 40th St., New York 16.

Water is Vital!

ITS PROPER TREATMENT IS SO IMPORTANT AS TO DESERVE NOTHING LESS THAN THE BEST IN PLANT EQUIPMENT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SAFETY
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